

HEALTH AND SAFETY PLAN

DETREX RD/RA SOURCE CONTROL AREA DETREX FACILITY ASHTABULA, OH DOCKET NO. V-W-98-C-450

Prepared for
Detrex Corporation
Ashtabula, OH

June 2008



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Activity Log, Daily Instrument Calibration Checklist

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	Glossary of Terms, Acronyms and Abbreviations
ACGIH	American Conference of Governmental Industrial Hygienists
analyzer	refers to the field instrument described in Section 6.1
atm	Atmosphere
°C	Centigrade
Carcinogen	a substance that can cause cancer
cc	cubic centimeter
CGI	Combustible Gas Indicator
CM	Construction Manager
CNS	Central Nervous System
CMS	Corrective Measures Study
COC	Chemicals of Concern
DERA	Detailed Ecological Risk Assessment
eV	Electron Volts
°F	Fahrenheit
HHRA	Human Health Risk Assessment
HSP	Health and Safety Plan
kg	Kilogram
LEL	Lower Explosive Limit
Lpm	liters per minute
MCS	Media Cleanup Standard
MSDS	Material Safety Data Sheet
m	meter
ND	not detected
NIOSH	National Institute for Occupational Safety and Health
OBZ	operator's breathing zone
OEL	occupational exposure limit
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PID	Photoionization Detector

	Glossary of Terms, Acronyms and Abbreviations
PM	Project Manager
ppb	parts per billion
ppm	parts per million
QAPP	Quality Assurance Project Plan
REL	Recommended Exposure Limit
RHSM	Regional Health and Safety Manager
SMS	Safety Management Standard
SSO	Site Safety Officer
SSR	Subcontractor's Safety Representative
STEL	Short Term Exposure Limit
SWMUs	Solid Waste Management Units
TIR	Thermal Infrared Radiation
TLV	Threshold Limit Value
TCLP	Toxicity Characteristic Leachate Procedure
UEL	Upper Explosive Limit
URS	URS Corporation and Subsidiaries
VOC	Volatile Organic Compound
VCA	Voluntary Corrective Action

SITE SPECIFIC HEALTH & SAFETY PLAN DETREX CORPORATION 1100 STATE ROAD ASHTABULA, OHIO

JUNE 2008

Jim Anderson/Katy Alfaro	Date	
Health & Safety Plan Preparer		
Martin Schmidt, PhD, CHMM, CPG	Date	
Sr. Project Manager		
Cece Weldon, CHMM, CSP	Date	
Regional Manager of Health and Safety		

THIS HSP IS TO BE USED FOR THE SPECIFIC PROJECT DESCRIBED HEREIN. IT IS NOT TO BE USED FOR ANY OTHER PROJECT. THIS HSP WILL BE REVIEWED AND UPDATED BY THE HEALTH AND SAFETY MANAGER A MINIMUM OF 1 YEAR FROM THE PREPARATION DATE OR AS SITE CONDITIONS OR PROJECT REQUIREMENTS CHANGE.

This Health and Safety Plan has been prepared by URS Corporation for the purpose of aiding in the activities associated with the Detrex facility in Ashtabula, Ohio. The limited objectives of this plan, along with the evolving conditions and chemical effects on the environment and health, must be considered when evaluating this plan since subsequent facts may become known that may make this plan premature or inaccurate. Acceptance of this plan in performance of the contract under which it is prepared does not mean that the Detrex Corporation adopts the conclusions, recommendations, or other views expressed herein, which may not necessarily reflect the official position of the Detrex Corporation.

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The purpose of this Health and Safety Plan (HSP) is to set forth, in an orderly and logical fashion, appropriate health and safety procedures to be followed during activities associated with activities scheduled at the Detrex Corporation. The scope of this HSP will include the methods and procedures that will be followed during soil boring activities and the installation of groundwater monitoring/remediation wells.

This document will serve not only to explain the chemical and physical hazards associated with working on the Project, but will also outline approved measures for dealing with such hazards. Air monitoring procedures for airborne contaminants are also explained in this HSP.

The procedures presented in this plan comply with the following regulatory or guidance documents:

- NIOSH/OSHA/USCG/USEPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985.
- OSHA Occupational Safety and Health Standards for Hazardous Waste Operations and Emergency Response, 29 CFR 1910.120, August 22, 1994.
- Standard Operating Safety Guides, United States Environmental Protection Agency, Office of Emergency and Remedial Response, November 1984.
- USEPA Order 1440.2, Health and Safety Requirements for Employees Engaged in Field Activities, July 12, 1981.
- URS Safety Management Standards.

All personnel involved in onsite activities under this Health and Safety Plan will be required to follow the HSP protocols, as directed by the Site Safety Officer (SSO). In addition, the subcontractor(s) will be required to designate a SSO for their personnel and to follow, at a minimum, the requirements of this HSP.

All URS personnel who will be involved in intrusive activities onsite have completed the appropriate waste site worker training as required by OSHA 1910.120(e)(2), 1910.120(e)(3), and 1910.120(e)(8), as applicable, and the required medical surveillance as required by OSHA 1910.120(f). Copies of training certificates and medical surveillance certification for all URS field personnel will be maintained onsite.

2.1 HISTORICAL BACKGROUND

Fields Brook (the stream itself) drains a 5.6-square-mile watershed. The eastern portion of the watershed drains Ashtabula Township and the western portion drains the eastern section of the City of Ashtabula. Fields Brook has several tributaries, including the DS, Detrex and Route 11 tributaries. Figure 1 is a project location map.

During the 1970's and early 1980's, biota, sediments and surface water samples were collected from Fields Brook and analyzed. These investigations noted the presence of a number of priority pollutant compounds in the sediment, surface water, and fish from Fields Brook and the Ashtabula River below its confluence with Fields Brook. The presence of these pollutants was attributed to past operations performed at industrial facilities located along Fields Brook. Detrex Corporation (Detrex) was one of the facilities identified as a contributor to the Fields Brook contamination. Subsequent to the findings of these investigations, Fields Brook was placed on the National Priority List (NPL) of uncontrolled hazardous waste sites.

2.2 SITE DESCRIPTION AND CORRECTIVE MEASURES

During the 1980's, Detrex performed several subsurface investigations on its property to delineate areas of contamination that contributed to the contamination found in Fields Brook. These investigations indicated the presence of Dense Non-Aqueous Phase Liquids (DNAPL) located in the soil and groundwater underlying the Site.

During the 1990's, Detrex performed investigations of its property to define the areal extent of contamination and to identify remedial alternative applicable to addressing these sources of recontamination to the Fields Brook. Work conducted during the 1992 Source Control investigation at Detrex identified soil contamination, groundwater contamination, and the presence of dense, non-aqueous phase liquid (DNAPL). Work conducted in 1997 identified the presumed extent of the DNAPL layer and contaminated groundwater. Based on these investigations, it was determined that the installation of low permeability barrier wall and DNAPL collection system would protect against recontamination of Fields Brook. The low permeability barrier wall was installed during 2000. A DNAPL collection system was subsequently installed at the site.

2.3 SITE ACTIVITIES

The field investigation will consist of three tasks, soil borings using a direct push, hand auger techniques, and the excavation of test trenches. Activities will take place in areas where the contaminants were found on portions of the Detrex site and surrounding properties including the DS Tributary. Figures 2A and 2B provide sampling locations.

Soil and Groundwater Sampling

URS proposes to advance soil borings on Detrex property and conduct excavations in the DS Tributary. Additionally, URS proposes to advance approximately twenty (20) direct push technology (DPT) soil borings in the Detrex plant. All HSA and DPT boring activities will be performed by a pre-qualified operator (Northcoast Drilling Services of Grafton, Ohio). A qualified geologist will visually monitor the HSA and DPT operations and collect, classify and log soil samples using the United Soil Classification System (USCS) in accordance with American Society of Testing and Materials Method D2488-00 (ASTM, 2000). Per USEPA's verbal request, URS may use a backhoe and install a test trench in-place of DPT technology at various locations if access allows entry of the equipment.

HSA soil borings will be advanced using conventional drilling equipment per ASTM Method D6286-98 (ASTM, 1998). Samples will be continuously collected in 2-foot intervals using a split-barrel (split-spoon), steel sampler. The sampler will be decontaminated between sampling events with a non-phosphate soap and copious amounts of de-ionized water. The sampler will be hammered to the desired depth, and then retrieved. Upon retrieval from the sampler, the soil sample will be description and screening for volatile organic vapors. DPT soil borings will be advanced using a hydraulically-driven, direct-push equipment (truck-mounted Geoprobe® Model 5400) per ASTM Method D6282-98 (ASTM, 1998). Samples will be continuously collected in 4-foot intervals using a large-bore, dual-tube, steel sampler. The sampler will be lined with dedicated, vinyl acetate liners. The sampler will be pushed to the desired depth, and then retrieved. Upon retrieval from the sampler, the soil samples will be divided into 2-foot intervals for description and screening. The borings will be advanced to the top of the till clay unit to approximate depths ranging from 20 to 30 feet below ground surface (bgs). One soil sample from each boring with the highest field screening reading will be submitted to Firstech Environmental Laboratories of Cleveland, Ohio for laboratory analysis for Volatile Organic Compounds (VOCs) by method 8260B and Semi-Volatile Organic Compounds (SVOCs) by method 8270C.

Field Screening and Sample Selection

The sample screening will be conducted on the samples contained in the plastic bags using a photoionization detector (PID) with a 10.6 eV lamp. Samples showing high concentrations of volatile organic compounds (VOCs) as determined by the field screening will be selected for laboratory analysis.

As requested by the USEPA, URS will conduct a hand auger survey and excavate test trenches in the DS Tributary. Geoprobes will be completed onsite in the source area.

Samples will be submitted to the Laboratory for VOCs, SVOCs, and metals. Following sampling, the trenches will be backfilled with the excavated material.

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Laboratory Analysis

Samples submitted for analysis will be couriered to Firstech Environmental Laboratories of Cleveland, Ohio for VOCs, SVOCs, and metals analyses.

URS will have site safety and health oversight and coordination responsibilities for URS personnel; each subcontractor will be held accountable for the safe and healthful performance of work by each of their employees, subcontractors, or support personnel who may enter the site.

URS will strictly adhere to the provisions of this Health and Safety Plan, along with the applicable regulations issued by governmental entities. The Project Manager (PM), Site Safety Officer (SSO) will be provided with copies of this HSP.

3.1 PROJECT MANAGER (MARTIN SCHMIDT)

The PM shall direct URS onsite operations. The PM may delegate all or part of these duties to a properly qualified URS employee. At the site, the PM, assisted by the SSO, has primary responsibility for:

- Seeing that appropriate personal protective equipment and monitoring equipment is available and properly utilized by all onsite URS employees.
- Establishing that URS personnel are aware of the provisions of this plan, are instructed in the work practices necessary to ensure safety, and are familiar with planned procedures for dealing with emergencies.
- Establishing that all URS onsite personnel have completed a minimum of 40 hours of health and safety training and have appropriate medical clearance as required by 29 CFR 1910.120, and have been fit tested for the appropriate respirators.
- Seeing that URS personnel are aware of the potential hazards associated with site operations.
- Monitoring the safety performance of all URS personnel to see that the required work practices are employed.
- Correcting any URS work practices or conditions that may result in injury or exposure to hazardous substances.
- Preparing any accident/incident reports for URS activities (URS Incident Report Form 49-1 located in Appendix D).
- Seeing to the completion of Plan Compliance Agreements by URS personnel (See Appendix E).
- Halting URS site operations, if necessary, in the event of an emergency or to correct unsafe work practices.
- Seeing that utility clearances are obtained, confirmed, and documented prior to the commencement of work.
- Seeing that the appropriate Safety Management Standards are appended to this HSP and are available on site.
- Reviewing and approving this project health and safety plan.

3.2 SITE SAFETY OFFICER (ANTON HEITGER AND JERRY KAMINSKI)

The Site Safety Officer's (SSO) duties may be carried out by the PM or other qualified URS site manager. The SSO is responsible for:

- Implementing project Health and Safety Plans, and reporting any deviations from the anticipated conditions described in the plan to the PM, and, if necessary, the RHSM.
- Determining that monitoring equipment is used properly by URS personnel and is calibrated in accordance with manufacturer's instructions or other standards, and that results are properly recorded and filed.
- Check with Health and Safety Representative to assure URS personnel have current HAZWOPER medical clearance and training.
- Assuming any other duties as directed by the PM or RHSM.
- Coordinating with URS Health and Safety Professional to identify URS personnel on site for whom special PPE, exposure monitoring, or work restrictions may be required.
- Conducting daily safety meetings for all site personnel in accordance with Section 13.
- Conducting daily site inspections prior to the start of each shift. All inspections must be documented (preferably in a bound field logbook).
- Providing ongoing review of the protection level needs as project work is performed, and informing the PM of the need to upgrade/downgrade protection levels as appropriate.
- Seeing that decontamination procedures described in Section 10.0 are followed by URS personnel.
- Establishing monitoring of URS personnel and recording results of exposure evaluations.
- Halting URS site operations, if necessary, in the event of an emergency or to correct unsafe work practices.
- Maintaining the visitor log.
- Posting OSHA "Safety of the Job" and other required posters at the site.

3.3 REGIONAL HEALTH AND SAFETY MANAGER (CECE WELDON, CHMM, ASP)

The RHSM is responsible for:

- Determining the need for and conducting periodic audits of the operation to evaluate compliance with this plan.
- Providing health and safety support as requested by the SSO and PM.
- Reviewing and giving final approval to this HSP.
- Removal and replacement of personnel working in an unsafe manner in conjunction with the
- Reviewing any addendum or alterations of this HASP.

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3.4 PROJECT PERSONNEL (ANTON HEITGER AND JERRY KAMINSKI)

Project personnel involved in onsite investigations and operations are responsible for:

- Taking all reasonable precautions to prevent injury to themselves and to their fellow employees.
- Performing only those tasks that they believe they can do safely, and immediately reporting any accidents and/or unsafe conditions to the SSO or PM.
- Implementing the procedures set forth in the Health and Safety Plan, and reporting any deviations from the procedures described in the Plan to the SSO or PM for action.
- Notifying the PM and SSO of any special medical problems (i.e., allergies) and seeing that all onsite URS personnel are aware of such problems.
- Reviewing project health and safety plan and signing Safety Plan Compliance Agreement.

3.5 SUBCONTRACTOR'S SAFETY REPRESENTATIVE

Each subcontractor is required to designate a Subcontractor's Safety Representative (SSR) who is the subcontractor supervisor. The SSR is responsible for the safe and healthful performance of work by his work force and subcontractors. During subcontractor activities onsite, the SSR will perform continuing work area inspections, and conduct safety meetings and safety orientations for all new employees. The SSR will attend periodic safety meetings with the SSO. The SSR will also investigate accidents and exposures involving subcontractor personnel.

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5.1 CHEMICAL HAZARDS

Based on the investigations completed to date on the Detrex facility, a variety of organic compounds and metals have been identified in the soils, sediment and groundwater at the site that can potentially impact the Health and Safety of URS personnel. These contaminants have not been detected in the portion of the site where activities covered under this HSP will take place. These include chloroform, hexachlorobenzene (HCB), hexachlorobutadiene, polychlorinated biphenyls (PCBs), 1,1,2,2-tetrachloroethane, tetrachloroethylene (PCE), 1,1,2-trichloroethane, trichloroethylene (TCE), and vinyl chloride; Hexachlorobutadiene has a very low threshold limit value, 0.02 ppm.

- Chloroform
- Hexachlorobutadiene
- Tetrachloroethene
- 1,1,2-Trichloroethane
- 1,1,2,2-Tetrachloroethane
- Vinyl Chloride
- Trichloroethene

- 1,1-Dichloroethene
- 1,1,1-Trichloroethane
- trans-1,2-Dichloroethene
- cis-1,2-Dichloroethene
- Hexachlorobenzene
- Polychlorinated biphenyls (PCBs)
- 1,1,1,2-Tetrachloroethane

The chemicals listed above are considered the Chemicals of Concern (COCs) for the site. The exposure limits associated with the COCs are listed in Appendix A. The risk of exposure to these chemicals can be by ingestion, dermal, or respiratory routes, depending on the type and concentration of compounds encountered during field activities. The information contained in Appendix A was taken from the NIOSH Pocket Guide to Chemical Hazards. Information from alternate sources was obtained for COCs not included in the NIOSH Pocket Guide to Chemical Hazards.

From an occupational health standpoint, given that any potential exposure to site personnel will be only for a *short period of time (intermittent for several days)*, the levels of contaminants that have been, or could be, encountered during site activities *should not represent a significant concern* if the provisions of this HSP are appropriately implemented. However, *the site is still operational*, and DNAPL is present in the soil and groundwater, so the potential for exposure to elevated levels of these contaminants may exist. Overviews of the hazards associated with exposure to the chemicals that may pose a hazard during site activities are presented below in terms of the following types of occupational exposure limits:

PEL - Permissible Exposure Limit (OSHA Standard)

TLV - Threshold Limit Value (ACGIH Guidance)

REL - Recommended Exposure Limit (NIOSH Guidance)

STEL- Short Term Exposure Limit

C - Ceiling

OSHA Permissible Exposure Limits (PELs), ACGIH Threshold Limit Values (TLVs), and NIOSH Recommended Exposure Limits (RELs) are time-weighted averages (TWAs) defined as concentrations for a normal 8-hour work day and 40-hour work week to which almost all workers can be repeatedly exposed without suffering adverse health effects

Short Term Exposure Limit (STEL) is defined as the concentration to which workers can be exposed for short time periods without irritation, tissue damage, or narcosis sufficient to likely cause impairment of self-rescue or precipitate accidental injury. The STEL is a 15-minute time-weighted average that should not be exceeded at any time during the workday. STELs are used by OSHA, ACGIH and NIOSH for chemical exposure criteria.

A ceiling value (C) is a concentration that should not be exceeded at any time in any workday. Ceiling limits are used by OSHA, ACGIH and NIOSH for chemical exposure criteria.

Skin contact with potentially contaminated materials will be minimized by the use of personal protective clothing (as described in Section 7.0). Inhalation of vapors or particulates during the site activities will be minimized by air monitoring and the use of engineering controls, and respiratory protection will be used if Action Levels described in Section 9.0 are exceeded. Ingestion of contaminated materials will be minimized by the use of appropriate personal hygiene procedures during decontamination (i.e., thoroughly washing face and hands with soap and water after leaving the work area and prior to eating or drinking; and, no eating or smoking while in work area).

5.1.1 Hazard Communication Materials

Materials which are considered hazardous materials under the OSHA Hazard Communication Standard (29 CFR 1910.1200) may be used during this project. In accordance with the URS Hazard Communication Program, the MSDS for the hazardous materials will be stored at the site. The SSO will make copies of these MSDS available to any subcontractor on this project. Personnel with the potential to work with hazardous materials should be trained in accordance with URS Safety Management Standard (SMS) 002, Worker Right to Know. A copy of URS SMS 002 is included in Appendix B.

5.2 CONTROL OF EXPOSURE TO CHEMICALS HAZARDS

Potential hazards will be reduced by protecting against exposures to contaminants first by engineering and administrative controls or secondly by the utilization of appropriate PPE. The engineering and administrative controls to be implemented include:

Engineering Controls

- Using remote sampling devices such as tongs or shovels to avoid contact with contaminated media.
- Having the driller collect soil samples and containing them in zip-loc bags. URS personnel will observe the soil samples contained in zip-loc bags outside of the exclusion zone.

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Large, industrial-style fans may be used to help dissipate volatile contaminants from the breathing zone during the drilling activities in the exclusion zone (e.g. drilling and well installation). These fans will be placed upwind of the work area.

Administrative Controls

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- A clean work surface will be maintained to avoid contact with contaminated media.
- Distance between worker and actual contaminated area (e.g., placing of heavy equipment on clean side during certain activities to provide some measure of remoteness of the operation).
- Staying upwind from contaminant emissions.
- Ensuring only essential personnel are in work area.

PPE to protect the body against contact with known or anticipated chemical hazards are divided into five levels of protection categories (i.e. Level A, B, C, Modified D, and D) according to the degree of protection afforded. The initial levels of personal protective equipment to be used while performing the work activities described in Section 1 are discussed in Section 7, Initial Levels of Protection. If the PPE for any level of protection needs to be modified to be appropriate for the specific hazard encountered, an appropriate Addendum to this HASP will be prepared by the URS RHSM, and approved by the RHSM.

Levels of protection can be upgraded by the URS SSO if they are not appropriate; downgrading of PPE requires approval by the URS RHSM.

5.3 PHYSICAL HAZARDS

Physical hazards at the surface range from the dangers of tripping and falling on uneven ground to those associated with the operation of heavy equipment such as cranes and backhoes. The following are physical hazards, which may be encountered during site activities.

5.3.1 Heat Stress Recognition and Control

Heat stress monitoring shall commence when personnel are wearing PPE, including Nomex or Tyvek®-type coveralls, and the ambient temperature exceeds 70°F. If standard work garments (cotton coveralls) are worn, monitoring shall commence at 85°F. The URS SMS 018, Heat Stress, included in Appendix B, will be implemented to address this hazard.

The stress of working in hot environments can cause several recognized physical injuries, which in order of increasing severity include: heat rash, heat cramps, heat exhaustion, and heat stroke. Heat stroke can be fatal, so it is important to be able to identify the signs of heat stress and know what actions to take to prevent conditions from becoming more serious.

It is important to drink plenty of liquids to avoid dehydration. In hot work environments, all personnel should drink approximately 16 fl oz. of water prior to commencing work. Field personnel should drink electrolyte fluids at his/her break consistent with fluid loss, recognizing that the level of thirst is not always an accurate indicator of fluid loss. For this reason, fluid consumption will be strongly encouraged

Some of the symptoms from heat related illness are listed below. The URS SMS 018, Heat Stress, Appendix F, will be implemented to address this hazard. The purpose of this procedure is to protect project personnel from heat related illnesses

It occurs in skin that is persistently wetted by un-evaporated sweat	
Red rash, impaired sweating, mild discomfort, lowered heat tolerance.	
Rest in cooler environment and water to drink.	
Profuse sweating with inadequate replacement of water and salt.	
Muscle spasms, pain in muscles of abdomen and extremities.	
Stop work and rest in cooler environment and water to drink.	
Physical exertion in hot environment, nervous system control and heart output is inadequate to meet demands of heat and dehydration.	
Pallor, faintness, dizziness, temporary loss of respiration, profuse sweating, clammy skin.	
Lay flat and rest in cooler environment. Remove protective clothing. Drink water. Transport to medical facility if no signs of improvement.	
Excessive physical exertion in hot environment. This is a serious problem and can be fatal. Often circulation is compromised to point of shock.	
Dizziness, nausea, severe headache, hot dry skin, cessation of sweating, high temperature (usually 100 degrees Fahrenheit and rising), confusion, collapse, delirium, coma, staggering gait, convulsions, unconsciousness.	
THIS IS A MEDICAL EMERGENCY! SUMMON MEDICAL ASSISTANCE IMMEDIATELY. The following should be performed on victims of heat stroke:	
1. Take victim to cooler and uncontaminated area;	
2. Remove protective clothing;	
3. Give water to drink;	
4. Cool victim with cold water, cold compresses, and rapid fanning; and	
5. Seek medical attention.	

5.3.2 Cold Stress Recognition and Control

Protection against cold stress should be initiated when temperatures drop below 45°F.

Exposure to cold working conditions can result in cold stress (hypothermia) and/or injury (frostbite) to hands, feet, and head. Hypothermia can result when the core body temperature drops below 36°C (96.8°F). Lower body temperature will likely result in dizziness, drowsiness, disorientation, slurred speech, or loss of consciousness, with possible fatal consequences. Pain the extremities may be the first warning of danger to cold stress. Shivering develops when the body temperature has fallen to 35°C (95°F).

Hypothermia can be brought on by exposure to cold air, immersion in cold water, or a combination of both. Wind chill factor, the cooling power of moving air, is a critical factor in cold stress.

Workers must wear adequate insulating clothing if work is performed in temperatures below 4°C (40°F). At temperatures of 2°C (35.6°F or less), workers whose clothing becomes wet should be immediately provided with a change of clothing, and if necessary, treated for hypothermia. Treatment includes warming the victim with skin-to-skin contact, or by providing warm blankets or other coverings, and drinking warm liquids. Skin exposure should not be permitted at temperatures of -32°C (-25°F) or below.

If fine work is to be performed with bare hands for more than 10-20 minutes at temperatures below 16°C (60°F), provisions should be made for keeping the workers' hands warm. If equivalent chill temperatures fall below 40°F and fine manual dexterity is not required, then gloves should be worn. Metal handles of tools should be covered with insulating material at air temperatures below -1°C (30°F).

If work is to be performed continuously in the cold when the wind chill factor is at or below -7°C (19°F), heated warming shelters (tents, trailers, vehicle cabs) should be made available nearby.

The URS SMS 059, Cold Stress, included in Appendix B, will be implemented to address this hazard.

5.3.3 Noise Hazards

Previous surveys indicate that equipment used for excavations may produce continuous and impact noise at or above the action level of 85 dBA. All URS personnel within 25 feet of operating equipment, or near an operation that creates noise levels high enough to impair conversation, shall wear hearing protective devices (either muffs or plugs). URS personnel who are in the Medical Surveillance program are automatically enrolled in the URS Hearing Conservation Program and have had baseline and, where appropriate, annual audiograms. Personnel will wash their hands with soap and water prior to inserting earplugs to avoid initiating ear infections. All personnel will follow the safety guidelines outlined in URS SMS 026, *Noise and Hearing Conservation*, as provided in Appendix B.

5.3.4 Slip/Trip/Fall Hazards

Workers should exercise caution when walking around the site to avoid fall and trip hazards. If there are holes or uneven terrain in the work area that could cause site personnel to fall or trip, they must be covered, flagged or marked to warn workers. The same is true of tripping hazards that may exist inside of the tunnel.

Workers should exercise caution around open excavations, such as test pits, and avoid getting closer than two feet to the edge of an unsloped excavation unless guardrails or fall protection is provided. If conditions become slippery, workers should take small steps with their feet pointed slightly outward to decrease the probability of slipping. Gravel or sand should be spread in muddy areas to reduce slipperiness. Workers should watch where they are walking and walk only in areas of good stability. Workers should also exercise caution around open manholes and access shafts.

5.3.5 Heavy Equipment

Operation of heavy equipment (geoprobe and excavator) during site activities presents potential physical hazards to personnel. All personnel working the vicinity of heavy equipment will follow the safety guidelines outlined in URS SMS 019, *Heavy Equipment Operations*, as provided in Appendix B.

The following precautions must be observed whenever heavy equipment is in use:

- Personal protective equipment (PPE) such as steel-toed shoes, safety glasses or goggles, traffic safety vests and hard hats must be worn whenever such equipment is present.
- Personnel must at all times be aware of the location and operation of heavy equipment, and take precautions to avoid getting in the way of its operation. Never assume that the equipment operator sees you; make eye contact and use hand signals to inform the operator of your intent, particularly if you intend to work near or approach the equipment.
- Traffic safety vests ARE REQUIRED for URS personnel working near mobile heavy equipment, such as backhoes and other excavators.
- Never walk directly in back of or to the side of, heavy equipment without the operator's acknowledgment.
- When an equipment operator must operate in tight quarters, the equipment subcontractor should provide a person to assist in guiding the operator's movements.
- Keep all non-essential personnel out of the work area.
- Any heavy equipment that is used in the exclusion zone should remain in that zone until its
 task is completed. The equipment subcontractor should completely decontaminate such
 equipment in the designated equipment decontamination area as required prior to moving the
 equipment outside of the EZ/CRC.

5.3.6 Underground and Aboveground Utilities

Prior to any excavation activity, the local Dig-Safe number will be called to request utility companies to mark their lines for all off-site locations. For all on-site locations, Detrex must provide clearance. In addition, an area inspection will be made to identify subsurface and overhead utilities through the presence of manholes, pull boxes, valve boxes, utility markers, vent risers, and the like.

The Project Manager or SSO is responsible for locating overhead and underground utilities prior to the commencement of any subsurface (> 0.3 meters (1 ft.)) activities. Resources include site plans, utility companies, and regional utility locating services. The proper utility company personnel shall certify in writing to the Project Manager or SSO the deactivation of underground utilities, and the certification retained in the project files.

Procedures for activities proximal to utility locations are located in URS SMS 034, found in Appendix B.

Excavation, drilling, crane, or similar operations adjacent to overhead lines shall not be initiated until operations are coordinated with the utility officials. Operations adjacent to overhead lines are prohibited unless one of the following conditions is satisfied:

- Power has been shut off and positive means (e.g. lockout/tagout) have been taken to prevent lines from being energized. Wherever possible, the URS SSO will observe power shut off and place a lock and tag on the switch. In all cases utility company personnel shall certify in writing to the Project Manager or SSO the deactivation of overhead utilities, and the certification retained in the project files. The Project Manager or SSO must also attempt to verify power shut off by checking that power is no longer available to the affected building or equipment.
- Equipment, or any part of the equipment, cannot come within the following minimum clearance from energized overhead lines:

Power Lines Nominal System (kv)	Minimum Required <u>Clearance</u>	
0-50	10 feet	
51- 200	15 feet	
201-300	20 feet	
301-500	25 feet	
501-750	35 feet	
751-1000	45 feet	

5.3.7 Lifting Hazards

The following guidelines will be followed whenever lifting equipment such as portable generators, coolers filled with samples, any other objects that are of odd size or shape, or that weigh over 40 pounds. All personnel will follow the safety guidelines outlined in URS SMS 069, Back Injury Prevention, as provided in Appendix B.

- Get help when lifting heavy loads. Portable generators will only be lifted using a two-person lift.
- When moving heavy objects such as drums or containers, use a dolly or other means of assistance.
- Plan the lift. If lifting a heavy object, plan the route and where to place the object. In addition, plan communication signals to be used (i.e., "1,2,3, lift," etc.)
- Wear sturdy shoes in good conditions that supply traction when performing lifts.
- Keep your back straight and head aligned during the lift and use your legs to lift the load do not twist or bend from the waist. Keep the load in front of you – do not lift or carry objects from the side.
- Keeping the heavy part of the load close to your body will help maintain your balance.

5.3.8 Biological Hazards

There is a risk of injury from biological hazards at the Site at or near natural grassy areas where exposure to toxic plants, noxious insects and poisonous snakes and other dangerous vertebrates is possible (feral cats, stray dogs, raccoons, skunks, rats, and other mammals to be resident or pass through the Site). Protective boots, clothing, repellents and other appropriate equipment are recommended. It will generally be best to avoid such animals when possible. If workers encounter anything unusual that might indicate a rabid animal, contact animal control or the police. The URS SMS 047, Biological Hazards, is included in Appendix B.

5.3.9 Work Zone Traffic Control

If URS operations require work performed on roads, highways or other areas where motor vehicles may be a hazard, all personnel will follow the safety guidelines outlined in URS SMS-032, Work Zone Traffic Control. A copy of URS SMS 032 is included in Appendix B.

5.3.10 Drilling Safety Guidelines

Work activities at the Site may require the use of a drill rig or geoprobe rig. All personnel in the vicinity of the operating rig will follow the safety guidelines outlined in URS SMS 056, Drilling Safety Guidelines, as provided in Appendix B. Prior to any excavation activity, the local Dig-Safe number will be called to request utility companies to mark their lines.

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5.3.11 Electrical Safety

Electrical hazards may exist at the Site. The following general precautions must be taken to prevent accidental contact with energized sources:

- Overhead lines must be identified and equipment must be kept at least 10 feet from energized lines or any other distance required by local ordinances, whichever is greater. It is important to note that power lines and hoist lines can be moved significantly by wind;
- Drill rigs shall never be moved with the mast erect;
- Underground utilities must be located before drilling or excavating begins. Appropriate
 utility companies must be contacted before intrusive work begins in accordance with local or
 state requirements for utility company notification;
- For drilling and excavation at industrial or other locations where underground utilities are owned by the client, as-built drawings of utility locations should be obtained if possible;
- As a general precaution, URS employees shall avoid contact with operating drill rigs or backhoes to reduce the risk of electrical shock should the equipment contact a power line;
- At the first sight of lightning, operations should be stopped and only resumed when conditions permit. Daily weather forecasts should be noted for predictions of electrical storms that may affect field operations.

All personnel using electrical equipment, or personnel in the vicinity of electrical equipment, will follow the safety guidelines outlined in URS SMS 12, *Electrical Safety*, as provided in Appendix B.

5.3.12 Flammable Hazards

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A few of the volatile chemicals expected to be present in the soil and groundwater at the site, or the vapors coming off the chemicals, are flammable or combustible. Therefore, URS SMS 014, *Fire Prevention*, and URS SMS 015, *Flammable and Combustible Liquids and Gasses*, included in Appendix B, will be implemented and the following safety precautions will be followed:

- In suspected areas of contamination where excavation or trenching activities are taking place, all non-essential engines shall be turned off. All gas or diesel powered equipment operating in these areas must be equipped with spark arrestors on the exhaust.
- Smoking will be strictly forbidden in work areas. No lighters or matches will be permitted in the investigation areas. Smoking elsewhere on the site will be in accordance with BASF policy.
- A type A-B-C fire extinguisher will be present in each work area.

5.3.13 DOT Shipping

Shipping of hazardous materials may be required at the site. Hazardous materials include, but are not limited to, compressed gases, laboratory reagents, field samples, hazardous wastes and

radioactive materials (i.e., Troxler nuclear gauges). Personnel involved in the shipping of materials should follow URS SMS 048, *DOT Shipping*. A copy of URS SMS 048 is included in Appendix B. Questions concerning shipping can also be directed to the URS HazMat Shipping Support Helpline at 800-381-0664.

5.3.14 Site Access and Special Hazards

The Site is an active chemical plant. DNAPL is present in the soil and groundwater. As such, specific hazards, including the presence of hazardous chemicals, may be encountered. The exposure to all hazardous chemicals should be eliminated or reduced. In order to eliminate or reduce hazardous chemical exposure, URS SMS 002, Worker Right to Know; SMS 017, Hazardous Waste Operations; and URS SMS 004, Accessing Industrial Sites should be followed by all URS personnel on-site. Copies of URS SMS 002, 004 and 017 are included in Appendix B.

Toxic and carcinogenic compounds are also present at the site. URS has developed SMS 050, Specific Chemical Hazard to specifically address toxic and carcinogenic compounds. A copy of URS SMS 050 is included in Appendix B. If exposure to these toxic or carcinogenic compounds is suspected, the Project Manager may request Personal Monitoring or Project Specific Medical Examination. A description of the Personal Monitoring and the purpose and scope of this exam is found in URS SMS 043, Personal Monitoring (Industrial Hygiene) and URS SMS 024, Medical Screening & Surveillance. Copies of URS SMS 043 and 024 are included in Appendix B.

5.3.15 Vehicle Safety

URS personnel operating motor vehicles that are owned, rented or leased by URS, and personnel using personal vehicles on company time must comply with URS SMS 57, Vehicle Safety Program. All URS personnel operating motor vehicles on company time are required to complete the 0.5-hour on-line defensive driving training module.

Before leaving the office, all field personnel must review the Vehicle Safety Program (URS SMS 057) and the web-based training module. Loss, damage, or injury due to vehicular accidents can be minimized by the following:

- Be alert: do not start driving if you are sleep deprived, hung over, or sick;
- Remain focused on the road and the ever-changing traffic conditions. **CELL PHONE USE IS PROHIBITED BY A DRIVER OF A VEHICLE.** If the call is that important, find a safe place and pull off the road;
- If traveling to an unfamiliar location, know in advance the route you plan to use and landmarks to watch for;
- Vehicle is in good operating condition;
- Use of safety restraints;

- Parked vehicles will have transmission engaged unless parking brake is engaged;
- Vehicles will be backed only after the operator ensures that there is nothing behind the vehicle. A spotter will be utilized as appropriate;
- Properly secured loads, i.e., field equipment not rolling around;
- Proper use of signals; and
- Personal safety: keep doors locked and windows only slightly down when on the road.

5.3.16 Trenching and Excavation

Physical hazards can arise from excavation and other earthwork activities. The possibility of cave-ins of excavations must be considered. Hazards encountered while working on or around heavy equipment must also be considered. All OSHA regulations for excavation (including OSHA Regulations 29 CFR 1926 Subpart P) are to be followed throughout this project. All personnel working in the vicinity of the excavation will follow the safety guidelines outlined in URS SMS 013, *Excavation Safety*, as provided in Appendix B.

If URS personnel or subcontractors need to peer into the excavation or measure the dimensions of the excavation, URS personnel and subcontractors will be responsible for evaluating the stability of the edges of the excavations for their work purposes only.

Excavations at the site deeper than 4-feet will be considered Permit-Required Confined Spaces. URS personnel will **not** enter Confined Spaces at the site.

5.3.17 Confined Space Entry

Oxygen deficient atmospheres may be encountered in groundwater collection sumps (manholes), excavations, and low-lying areas such as underground pipe trenches. Excavations or manholes are not to be entered unless absolutely necessary and then only after following appropriate confined space entry procedures. WRITTEN PERMISSION MUST BE OBTAINED FROM THE REGIONAL HEALTH AND SAFETY MANAGER BEFORE A CONFINED SPACE IS ENTERED

All personnel entering the permit-required confined space and all surface support personnel must adhere to applicable safety regulations for underground and confined space work. URS personnel will not be permitted in confined spaces unless they have completed confined space training meeting the requirements of OSHA 29 CFR 1910.146. URS personnel who can not provide proof of such training will not be permitted to perform work in areas identified as confined spaces.

All URS personnel working in confined spaces, or working as support personnel at the surface during confined space operations, will follow the guidelines outlined in URS SMS 010, *Confined Space Entry*.

6.1 CHEMICAL EXPOSURE MONITORING

The field instrumentation described in this health and safety plan has been specifically selected for the contaminants that may be reasonably anticipated to be encountered during this course of this project. Selection factors include anticipated airborne concentrations, potential interference, ionization potentials, instrument sensitivity, and occupational exposure limits. The Action Levels specified in Table 9-1 were established with the expectation that specific instruments will be used. DO NOT SUBSTITUTE INSTRUMENTS WITHOUT THE CONSENT OF THE REGIONAL HEALTH AND SAFETY MANAGER.

The monitoring equipment specified in Section 6.4 will be used on a regular basis to evaluate the potential for exposure to airborne contaminants, typically every ten to fifteen minutes. Monitoring will be conducted in the immediate vicinity of the contaminant source point or work area. The Action Levels and Responses are detailed in Table 9-1.

6.1.1 Personal Exposure Monitoring

In accordance with 29 CFR 1910.120(h), a URS industrial hygienist may perform quantitative personal monitoring on personnel at greatest risk of exposure (i.e., those working in the exclusion zone). The industrial hygienist will determine who to sample based upon site conditions at the time of the sampling. A laboratory accredited by the American Industrial Hygiene Association will perform analyses, and results will be reported and records maintained in accordance with OSHA criteria.

Procedures for personal monitoring are located in Safety Management Standard 43, *Personal Monitoring*, a copy of which is included in Appendix B.

6.2 BACKGROUND READINGS

All direct-reading instrument readings will be evaluated relative to background reading, not "meter zero". Prior to the start of work at each shift, instrument readings will be obtained outside of the work zone in order to determine the level of "background" readings. Site readings will be evaluated against these background readings (i.e., if an action level is listed as 3 ppm, it is evaluated as 3 ppm above background). The SSO should consult with the RHSM regarding the potential health hazards associated with background readings above 5 ppm.

6.3 DATA LOGGING

All monitoring data, including background readings, will be logged in the field logbook. The results of daily instrument calibrations can either be logged on the form provided in Attachment C or in the field logbook. All monitoring instruments will be calibrated in accordance with the manufacturer's instructions prior to the start of each shift. Calibration should also be performed when inconsistent or erratic readings are obtained. If an instrument

cannot be calibrated to specification, or becomes otherwise inoperable, all invasive site work will cease until the instrument is appropriately repaired or replaced; the PM or Regional Health and Safety Manager should be contacted for further guidance.

6.4 AIR QUALITY MONITORING INSTRUMENTATION AND TECHNIQUES

Photo Ionization Detector

A Photo Ionization Detector (PID) will be used to detect trace concentrations of certain organic gases in the air. The PID will be calibrated before each 8-hr work shift using an isobutylene standard for calibration. Calibrations will be documented. PID readings will be measured in the breathing zone of the most highly exposed worker (i.e., closest to the source).

6.5 WORK STOPPAGE RESPONSES

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage are exceeded:

- 1. The RHSM will be consulted immediately.
- 2. All personnel will be cleared from the work area.
- 3. Monitoring will be continued until intrusive work resumes.

Any chemical release to air, water, or soil must be reported to the RHSM at once.

6.6 CALIBRATION OF AIR MONITORING EQUIPMENT

If an instrument can not be calibrated to specification, or becomes otherwise inoperable, all invasive site work will cease until the instrument is appropriately repaired or replaced; the PM or RHSM should be contacted for further guidance.

6.7 MITIGATIVE MEASURES FOR CONTROL OF EMISSIONS

Based on engineering and administrative controls discussed in Section 5, vapor emissions resulting from normal field operations may exceed the response levels. If the response levels are exceeded at any monitoring location, implementation of mitigative measures to suppress vapor emissions will be required. Appropriate mitigative measures may include ceasing operations until the exact cause of the emissions can be identified and corrected.

6.8 DUST CONTROL

High winds and site operations can cause airborne dust hazards. If site operations generate dust levels that produce a sustained visible dust, a water mist will be applied to reduce dust

SECTIONSIX

Air Quality Monitoring and Mitigative Measures for Control of Emissions

generation. If the mist is not effective in reducing dust generation, personnel will upgrade their level of PPE as indicated in Table 9-1.

7.1 PERSONAL PROTECTIVE EQUIPMENT USE

The minimum Personal Protective Equipment (PPE) for site personnel is Level D Modified. Level D Modified PPE includes the following:

- Hardhat
- Poly-coated Tyvek coveralls
- Safety glasses with side shields (or impact resistant goggles)
- Steel-toed boots or Chemical-resistant steel-toed boots
- Ear protection (as required)
- Gloves
- Traffic safety vest in the vicinity of heavy equipment.

Activities conducted in the work zone (Figures 2A & 2B) will be conducted in Level B. Table 9-1 provides the description of the incremental PPE requirements relative to specific Action Levels, as well as the specific kinds of PPE to be used. Procedures for use and selection of personal protective equipment are located in URS SMS 029, included in Appendix B.

7.2 LIMITATIONS OF PROTECTIVE CLOTHING

The protective equipment ensembles selected for this project are anticipated to provide protection against the types and concentrations of hazardous materials that may potentially be encountered during field operations. However, no protective garment, glove or boot is resistant to all chemicals at any concentration; in fact, chemicals may continue to permeate or degrade a garment even after the source of the contamination is removed.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all URS personnel:

- When using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift
- Inspect all clothing, gloves and boots both prior to and during use for:
 - Imperfect seams
 - Non-uniform coatings
 - Tears
 - Poorly functioning closures
- Inspect reusable garments, boots and gloves both prior to and during use for:
 - Visible signs of chemical permeation such as swelling, discoloration, stiffness or brittleness

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Cracks or any signs of puncture or abrasion

Any reusable garments exhibiting any such characteristics will be discarded.

7.3 DURATION OF WORK TASKS

The duration of work tasks in which personnel use PPE ensembles that include chemical protective clothing (including Tyvek), will be established by the SSO. Variables to be considered include ambient temperature and other weather conditions, the capacity of individual personnel to work in the required level of PPE in heat and cold, and the limitations of specific PPE ensembles. Rest breaks will be scheduled according to heat stress monitoring protocols as described in URS SMS 018. A copy of URS SMS 018 is included in Appendix B.

7.4 PERSONAL PROTECTIVE EQUIPMENT SELECTION

Since personnel working onsite may encounter elevated levels of hazardous airborne contaminants released during excavation activities, or may come in contact with contaminants in wastes or soils, varying levels of protection must be available. The level of protection will be minimal in the offsite and support areas and maximal in the active drilling or excavation portion of the site. The purpose of personal protective equipment is to isolate personnel working onsite from the chemical, physical, and biological hazards present onsite. Careful selection of adequate personal protective equipment should protect the respiratory system, skin and body, face and eyes, feet and hands, head, and hearing.

With the exception of work in the work zone (Figures 2A and 2B), it is anticipated that Level D Modified protection will be utilized during most of the on-site activities. Work within the Source Zone will be performed in Level B. If a higher level of personal protection is required at any time, the SSO will instruct personnel to upgrade and the RHSM will be contacted. Components of all applicable levels of personal protection are listed in Table 7-1

8.1 RESPIRATOR SELECTION

Engineering controls and safe work practices (e.g. elimination of the source of contamination, ventilation equipment, working upwind, limiting exposure time, etc), must always be the primary control for air contaminants. Respirators will be used if engineering or administrative controls are not feasible for controlling airborne exposures below acceptable concentrations and as an interim control measure while additional engineering or administrative controls are implemented.

Once the need for respirators has been established, the respirators will be selected on the basis of the hazards to which the worker is exposed. Only NIOSH-approved respirators will be issued. Selection criteria established in 29 CFR 1910.134 has been used by the HSP Preparer in determining respirator requirements for this project.

CAUTION: Full-face piece or half-face piece air-purifying respirators are not to be used where there is an oxygen deficiency. Only air-supplied respirators with an emergency escape cylinder or self-contained breathing apparatus will be worn when an oxygen deficiency exists.

CAUTION: A respirator does not protect against excessive heat or against hazardous substance that can attack the body through the skin.

The forms of the airborne contaminants have been evaluated based upon the suspected contaminants of concern. Evaluation of the concentration of the airborne chemical hazard will be performed using direct reading instruments to determine what type respirator will be used. Airborne readings will be compared to Action Levels in Table 9-1. See action level/respirator requirements in Section 6.

8.2 MEDICAL SCREENING

URS employees are enrolled in the URS Medical Surveillance Program and are medically evaluated in compliance with the requirements of 29 CFR 1910.134(a)(10).

The medical status of each employee is reviewed annually and as may be deemed necessary by the examining physician if the physical status of the employee changes.

8.3 FIT TESTING

A person wearing a respirator must be clean-shaven in the area of the face piece seal. Long hair, sideburns, and skullcaps that extend under the seal are not allowed. Glasses with temple pieces extending under the seal are not allowed for full-face respirators. Persons with facial conditions that prevent a proper seal are not allowed to wear a respirator until the condition is corrected. Facial conditions that may cause a seal problem include missing dentures, scars, severe acne, etc. Contact lenses may be worn with respiratory protection.

No individual will enter an area where the use of respiratory protective equipment is required unless the person has been fit tested within the last year. Fit testing will be performed in accordance with accepted fit test procedures defined in URS SMS 042, included in Appendix B.

8.4 RESPIRATOR USE INSTRUCTION

Only those employees who have been properly trained and qualified on the specific type of respirator to be worn may use respirators. No individual will enter an area where the use of respiratory protective equipment is required unless the person has been trained.

All employees whose job assignment requires the use of respirators are given training in accordance with 29 CFR 1910.134 during initial 40-hour and annual Refresher training for hazardous waste operations.

Hands-on training on inspecting and donning a respirator, including user seal checks, was also provided at the time of fit testing. Retraining is performed annually on each type of respirator worn by the individual. In addition, site-specific respirator training is provided during Site Safety Briefings conducted by the SSO. Training records are kept in the employee's training file.

Particulate respirator cartridges should be changed out when the wearer has difficulty breathing through the cartridges. Chemical gas or vapor respirator cartridges will be *changed out at least daily*.

The fit of a chemical gas or vapor respirator should be rechecked and the cartridges changed if the wearer detects chemical odor or feels chemical irritation on the skin, both indicators of leakage or cartridge breakthrough.

8.5 RESPIRATOR INSPECTION

The user will inspect respirators before and after each day's use.

Inspection procedure, air purifying respirators (full-face piece and half-face piece cartridge respirators):

Examine the face piece for:

- Excessive dirt
- Cracks, tears, holes, or distortion from improper storage
- Inflexibility
- Cracked or badly scratched lenses (full-face only)
- Incorrectly mounted eyeglass lenses or broken or missing mounting clips (full-face only)
- Cracked or broken air purifying element holder, badly worn threads, or missing gaskets

Examine the head straps or head harness for:

- Breaks or cracks
- Broken or malfunctioning buckles
- Excessively worn serration on the headstraps, which may permit slippage

Examine the inhalation valves (2) and exhalation valve for:

- Foreign material (e.g. hairs, particles, etc.)
- Improper insertion of the valve body in the face piece
- Cracks, tears, or chips in the valve body, particularly in the sealing surface
- Missing or defective exhalation valve covers

Examine the air-purifying cartridge for:

- Missing or worn cartridge holder gasket
- Incorrect cartridge/canister for the hazard
- Incorrect cartridge installation, loose connections, or cross threading in the holder
- Cracks or dents in the outside case or threads of filter or cartridge/canister

8.6 CLEANING OF RESPIRATORS

Respirators assigned and worn by one individual must be dismantled and thoroughly cleaned and disinfected after each day's use. Visitor's or multi-assigned respirators must be cleaned and disinfected after each use. A disinfectant spray or wipe is approved as a disinfectant between uses during the day but not for cleaning and sanitizing after each day's use. Care must be taken to prevent damage from rough handling during the cleaning procedure. After cleaning, respirators must be reassembled.

Respirator Cleaning Procedure

Washing: Disassemble and wash with a mild liquid detergent in warm water (not to

exceed 110°F). A stiff bristle (not wire) brush may be used.

Rinsing: Rinse in clean water (110°F maximum) to remove all traces of detergent.

This is very important to prevent dermatitis.

Disinfecting: Thoroughly rinse or immerse in a sanitizer provided by the manufacturer.

Alternatively, a weak chlorine bleach solution (1 milliliter liquid

bleach/liter of water) may be used.

Final Rinsing: Rinse thoroughly in clean water (110°F maximum) to remove all traces of

disinfectant. This is very important to prevent dermatitis.

Drying: Drain and dry hanging by the straps from racks (take care to prevent

damage) or towel drying with clean soft clothes or paper towels.

8.7 MAINTENANCE OF RESPIRATORS

Routine respirator maintenance such as replacing missing valves, gaskets, nosecups etc., must only be performed by trained respirator users or a respirator manufacturer's representative. Only approved replacement parts must be used. Substitution of parts from a different brand or type of respirator is generally not possible, invalidates the technical approval of the respirator, and is not permitted. Any respirator suspected of being defective must be removed from service and replaced.

8.8 STORAGE OF RESPIRATORS

When not in use, respirators must be stored to protect them from dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and physical damage. Respirators must be stored in sealable (e.g. Ziplock® or twist-tie) reusable plastic bags between shifts.

The respirator storage environment must be clean, dry, and away from direct sunlight. Onsite cabinets or cases are suggested. Storing bagged respirators in vehicles is discouraged due to the potential for damage from other material or equipment.

8.9 ADDITIONAL INFORMATION

Additional information on the URS Respiratory Protection Program is located in URS SMS 042, included in Appendix B.

9.1 GENERAL

Barricade tape and/or barricades shall be used to delineate a work zone for safety purposes around the work area. The barriers should be set in a 25-foot radius (as practical) around the work area to provide sufficient maneuvering space for personnel and equipment. A short piece of barricade tape can be affixed to a secure upright (e.g., crane mast or vehicle antenna) to serve as a wind direction telltale. A five-foot opening in the barricades at the support zone (upwind of the work area) will serve as the personnel and equipment entry and exit point. The personnel decontamination station will be established at this point if formal decontamination procedures are required (see Section 9.0). All entry and exit from the work area will be made at this opening in order to control potential sources of contamination and leave contaminated soil and debris in the work area.

The PM or SSO (with the assistance of the facility representative) will determine an upwind evacuation area prior to each shift during excavation activities, and all personnel will be notified of its location. The PM or SSO establish a signal to use in the event of an emergency. Once this signal has been given, all personnel must immediately stop work and proceed to the evacuation area.

The SSO will verify that all site visitors sign the visitors' log. In addition, all URS personnel and site visitors entering the work area must present evidence of their participation in a medical surveillance program and completion of health and safety training programs that fulfill the requirements of this plan. These documents will be maintained on-size for the duration of this project.

The SSO will provide site hazard and emergency action information to all site visitors before they enter the site. Visitors will review and sign the Safety Plan Compliance Agreement.

9.2 WORK ZONES

Prior to the commencement of any intrusive activity at the site, work zones must be established as described below.

- Exclusion Zone A 25-foot (as practical) circle around the work area will be defined before work starts. The encircled area will constitute the "Exclusion Zone". This zone is where potentially hazardous contaminants and physical hazards to the workers will be contained. Appropriate personal protection as described in Section 7 will be required in this area. Plastic sheeting (visqueen) and/or tarps may be used as necessary to control contaminated materials spilled to the ground during site operations. The size of the Exclusion Zone may be altered to accommodate site conditions and to ensure contaminant containment.
- Contamination Reduction Zone (CRZ) a corridor leading from the Exclusion Zone will be defined, and will lead from the work area to a break area. All decontamination activities will occur in the CRZ. A waste container will be placed at the end of the corridor so contaminated disposable equipment can be placed inside and covered. Surface/soil contamination in this area should be controlled using plastic sheeting. No one will be

permitted into the Contamination Reduction Zone or Exclusion Zone unless they are in full compliance with the requirements of this Plan.

Support Zone – a Support Zone, the outermost part of the site, must be defined for each field activity. Support equipment is located in this uncontaminated or clean area. Normal work clothes are appropriate within this zone. The location of this zone depends on factors such as accessibility, wind direction (upwind of work area), and resources (i.e., roads, shelter, utilities).

When exiting the exclusion zone, or if the monitoring instrument readings indicate respirator use during work activities, the following steps will be followed whenever personnel leave the exclusion zone/work area:

- 1. Remove all equipment, sample containers, and notes to the CRZ. Obtain decontamination solutions (bleach, soap and water) and decon tools (shovels, auger flights, etc.) by brushing them with the decontamination solutions and then under a water rinse. A high-pressure steam cleaner may also be used for decon. All waste and spent decon solutions will be discharged into the sewer.
- 2. Scrub boots with a stiff bristle brush using bleach and soap, and then rinse with water. Washtubs and chairs will be provided.
- 3. Remove outer gloves (and boot covers, if used).
- 4. Remove Tyvek coveralls and place in disposal drum.
- 5. Remove hardhat and eye protection.
- 6. Remove respirator.
- 7. Remove inner gloves.
- 8. Wash hands and face.

The decontamination area will be covered with plastic sheeting, which will be replaced when torn or heavily soiled, and at the end of each shift.

Each worker will be responsible for cleaning, sanitizing and storing their own respirator in accordance with manufacturer's guidance (i.e., washing in warm water and detergent or sanitizing solution, air drying, and storing in a plastic storage bag; see Section 8). Cartridges will be changed in accordance with the procedures described in Section 8.4.

All spent decontamination fluids (rinse waters, etc.) shall be handled as directed by the PM and in accordance with relevant regulations.

10.1 SANITATION

Potable water will be made available at the site, either from a pressurized source or commercially available bottled water. Drinking cups will be supplied so personnel will neither drink directly from the source of water nor have to share drinking cups. Sources of non-potable water shall be clearly labeled as such.

Unless toilet facilities are available on site or transportation is readily available to transport personnel to nearby (within five minutes) toilet facilities, portable toilet facilities, such as chemical toilets, will be provided on site.

Washing facilities will be provided on site, and will be located in the decontamination area or the Soap, clean water, wash basins and single-use towels will be available for support area. personnel use.

URS procedures for site sanitation are located in Safety Management Standard 30, a copy of which is included in Appendix B.

10.2 DECONTAMINATION - MEDICAL EMERGENCIES

In the event of physical injury or other serious medical concerns, immediate first aid is to be administered in lieu of further decontamination efforts.

See Emergency Decontamination chart for a decision tree for emergency decontamination.

10.3 DECONTAMINATION OF TOOLS

When all work activities have been completed, contaminated tools used by URS personnel will be either appropriately decontaminated or properly disposed of as hazardous waste.

It is expected that all tools will be constructed of non-porous, non-absorbent materials. This will aid the decontamination process. Any tool, or part of a tool, which is made of a porous/absorbent material will be discarded and disposed of as a hazardous waste if it cannot be properly decontaminated.

Tools will be placed on a decontamination pad or into a bucket and thoroughly washed using a soap solution and brushing, followed by a fresh water rinse. All visible particles are to be removed before the tool is considered clean.

11.1 GENERAL

- 1. Eating, drinking, chewing gum or tobacco, and smoking are prohibited in the contamination reduction zone (CRZ) or where the possibility for the transfer of contamination exists.
- 2. All personnel will enter designated work areas only through the CRZ. All personnel leaving an exclusion/work zone must exit through the CRZ and pass through the decontamination station as described in Section 10.0.
- 3. Personnel will wash their hands and face thoroughly with soap and water prior to eating, drinking or smoking.
- 4. Avoid contact with potentially contaminated substances. Avoid, whenever possible, kneeling, leaning or sitting on contaminated surfaces. Do not place monitoring equipment on potentially contaminated surfaces.
- 5. All field crew members should make use of their senses to alert them to potentially dangerous situations in which they should not become involved (i.e., presence of strong, irritating or nauseating odors).
- 6. Only those vehicles and equipment required to complete work tasks should be permitted within the exclusion/work zone (cranes, excavators, and similar items). All non-essential vehicles should remain within the support zone.
- 7. Containers, such as drums, will be moved only with the proper equipment and will be secured to prevent dropping or loss of control during transport.
- 8. Field survey instruments, such as CGIs, should be covered with plastic or similar covering to minimize the potential for contamination.
- 9. No matches or lighters will be permitted in the exclusion zone or CRZ.
- 10. Contaminated protective equipment, such as respirators, hoses, boots, and disposable protective clothing, will not be removed from the exclusion zone or decontamination area until it has been cleaned, or properly packaged and labeled.
- 11. Prevent, to the extent possible, spills. In the event that a spill occurs, contain liquid if possible.
- 12. Prevent splashing of the contaminated materials.
- 13. Field crewmembers shall be familiar with the physical characteristics of the site operations including:
 - Wind direction in relation to the contaminated area:
 - Accessibility to equipment and vehicles;
 - Areas of known or suspected contamination;
 - Site access; and,
 - Nearest water sources.

- 14. The number of personnel and equipment in the exclusion zone should be minimized but only to the extent consistent with workforce requirements of safe site operations.
- 15. All wastes generated by URS activities at the site will be disposed of as directed by the PM.
- 16. All personal protective equipment will be used as specified and required.
- 17. The buddy system will be used at all times when conducting sewer rehabilitation work or when working in remote areas.
- 18. Personnel are to immediately notify the SSO or Site Manager if any indications of potential explosions or unusual conditions are observed.

11.2 SAMPLING PRACTICES

For all sampling activities, the following standard safety procedures shall be employed:

- 1. All sampling equipment should be cleaned before proceeding to the site.
- At the sampling site, sampling equipment should be cleaned after each use.
- Work in "cleaner" areas should be conducted first where practical.
- 4. All unauthorized personnel will remain outside exclusion zones at all times.

11.3 SAMPLE SHIPMENT / HAZARDOUS MASTERIALS SHIPMENT

Shipping of hazardous materials may be required at the site. Hazardous materials include, but are not limited to, compressed gases, laboratory reagents, filed samples, hazardous wastes and radioactive materials (i.e., Troxler nuclear gauges). Personnel involved in the shipping of materials should follow URS SMS 048, DOT Shipping. A copy of URS SMS 048 is included in Appendix B. If hazardous materials are to be shipped, then they must be shipped in accordance with those regulations by an individual who is certified as having been Function-Specific trained as required under the DOT regulations. Questions concerning shipping can also be directed to the URS HazMat Shipping Support Helpline at 800-381-0664.

It is URS policy to evacuate personnel from areas involved in hazardous material emergencies and to summon outside assistance from agencies with personnel trained to respond to the specific emergency. This section outlines the procedures to be followed by URS personnel in the event of a site emergency. These procedures are to be reviewed during the onsite safety briefings conducted by the SSO.

In the event of a fire or medical emergency, the emergency numbers identified on Table 12-1, Emergency Contacts, in Appendix C can be called for assistance.

12.1 PLACE OF REFUGE

In the event of a site emergency requiring evacuation, all personnel will evacuate to a predesignated area that is located a safe distance from any health or safety hazard (typically the URS field office, unless conditions dictate otherwise). The SSO (in cooperation with a facility representative) will designate a primary assembly area prior to the start of work each day. The daily pre-designated assembly area may have to be re-designated by the SSO in the event of an emergency where the area of influence affects the primary assembly area. Once assembled, the SSO shall take a head count. The SSO will evaluate the assembly area to determine if the area is outside the influence of the situation; if not, the SSO will redirect the group to a new assembly area where a new head count will be taken.

During any site evacuation, all employees shall be instructed to observe wind direction indicators. During evacuation, employees will be instructed to travel upwind or crosswind of the area of influence. The SSO will provide specific evacuation instructions, via the site emergency radio if necessary, to site personnel regarding the actual site conditions.

12.2 COMMUNICATION

A communication network must be set up to alert site personnel of emergencies and to summon outside emergency assistance. Where voice communication is not feasible an alarm system (i.e., sirens, horns, etc.) should be set up to alert employees of emergencies. Radio communication may also be used to communicate with personnel in the exclusion zone. Where phone service is not readily available, radios or portable phones should be used to communicate with outside agencies. Site personnel should be trained on the use of the site emergency communication network. Emergency phone numbers shall be posted at the phone or radio used for outside communication. The SSO is responsible for establishing the communication network prior to the start of work, and for explaining it to all site personnel during the site safety briefing.

In the event of an emergency, personnel will use the following hand signals where voice communications are not feasible:

<u>Signal</u>	<u>Definition</u>
Hands clutching throat	Out of air/can't breathe
Hands on top of head	Need assistance
Thumbs up	OK/I'm alright/I understand
Thumbs down	No/negative
Arms waving upright	Send back support
Grip partner's wrist	Exit area immediately

12.3 EMERGENCY RESPONSE PROCEDURES

12.3.1 Emergency Response Team

The emergency response team will consist of employees who assume the following roles:

- Emergency Care Provider(s)
 - Provide first aid/CPR as needed.

Communicator

The role of the communicator is to maintain contact with appropriate emergency services, providing as much information as possible, such as the number injured, the type and extent of injuries, and the exact location of the accident scene. The communicator should be located as close to the scene as possible in order to transmit to the emergency care providers any additional instructions that may be given by emergency services personnel in route.

SSO

The SSO should survey and assess existing and potential hazards, evacuate personnel as needed, and contain the hazard. Follow up responsibilities include replacing or repairing equipment, documenting the incident, and notifying personnel/agencies described under incident reporting. It also includes reviewing and revising site safety and contingency plans as necessary.

In the event of an emergency, follow the procedure outlined in the Emergency Response Checklist on the following page. Notify site personnel of the situation. Survey the scene to determine if the situation is safe, to determine what happened, and to search for other victims. The Emergency Response Checklist can be used to help remember the things to do in an emergency.

(west) at the flashing light onto east 23^{rd} . Travel on east 23^{rd} to the stop sign at Harbor Avenue. Turn left (south) on Harbor and then an immediate right onto east 24^{th} street. The hospital is on the south east corner of east 24^{th} street and Lake Avenue.

Directions to the Outpatient Clinic (non-emergency care):

Miller Outpatient Therapy

456 South Main Street Andover, Ohio 44003

Phone Number: 440-293-4226

Exiting the site to State Road, turn left (south) travel approximately 0.75 mile turn right (west) at the first road which is east 21st Street. You will cross State Route 11, turn left (south) onto southbound on-ramp for State Route 11. Travel south approximately 21 miles to US Route 6. Turn left (east) onto US Route 6 and travel approximately 7.4 miles to State Route 7 (Main Street). Turn right (south) onto State Route 7. The Clinic is near the intersection of State Route 7 and South Park Drive.

All injuries must be reported immediately to the URS Occupational Nurse (866-326-7321).

12.5 INCIDENT REPORT

All site injuries and illnesses must be reported to the SSO and PM immediately following first-aid treatment. The SSO will notify the Regional Health and Safety Manager. Work is to be stopped until the PM or SSO and RSO have determined the cause of the incident and have taken the appropriate action to prevent a reoccurrence. Any injury or illness, regardless of severity, is to be reported. A copy of the URS incident report form SMS 049 is included in Appendix D.

12.6 OPERATION SHUTDOWN

Under certain extreme hazardous situations the SSO or SSR may request that site operations be temporarily suspended while the underlying hazard is corrected or controlled. During operation shutdown, all personnel will be required to stand upwind to prevent exposure to fugitive emissions. The SSO, with concurrence from the Regional Health and Safety Manager, will have ultimate authority for operations shutdown and restart.

12.7 SPILL OR HAZARDOUS MATERIALS RELEASE

Small spills are immediately reported to the SSO and are dealt with according to the chemical manufacturer's recommended procedures found on the MSDS. Steps will be taken to contain and/or collect small spills for approved storage and disposal.

In the unlikely event of a larger release of hazardous materials as a result of site activities, site personnel will evacuate to the predesignated assembly area. The local fire department and the

Ohio EPA Emergency Response Unit (1-800-282-9378) will be notified by the SSO immediately and appropriate actions will be taken to protect the public health and mitigate the contaminant release. The Ohio EPA Emergency Response Unit can also be reached through the local police or fire department. The Project Manager will make the following emergency contacts:

Agency Name (and Address	/	Telephone N	lo.
Fire Department	Committee and a configuration of the second Property of the second section of the second section of the second	<u> 1995 - Philippin Colonia de Callago de Cal</u>	911 or 440-997-4641
Police Department			911 or 440-992-7172
Ashtabula County Medic 2420 Lake Avenue Ashtabula, Ohio 44004	al Center		440-997-6600
 Miller Outpatient Therap 456 South Main Street Andover, Ohio 44003 	у		440-293-4226
URS Health and Safety Man	agement and Field	Personnel	
Martin Schmidt	Project Manager	r	216-622-2400 After work hours 216-543-2168
Anton Heitger / Jerry Kaminski	URS Site Safety	Officer	216-622-2400
Jeanette Schrimsher	URS Occupation	nal Nurse	866-326-7321
Cece Weldon	Regional Health Manager	and Safety	248-553-9449 (Cell) 248-752-3405
Tom Steib	Detrex Manager	r	440- 997-6131
Environmental Protection A	gency		
Ohio EPA Emergency Re	esponse Unit	and the second s	800-282-9378
Ohio EPA		,,	614-466-8500

12.8 WEATHER EMERGENCIES

Weather forecasts 4 days ahead should be obtained during fieldwork planning. During field activities, the Project Manager will assess current weather conditions utilizing Radar websites (http://www.weather.gov/radar_tab.php). The following climatic factors should be considered in fieldwork planning:

- temperature range,
- rain,
- flood,
- wind,

- cyclone,
- electrical storm,
- dry, hot conditions and fire risk,
- snow, and
- UV exposure.

In the case of lightning, evacuate to the pre-designated area or field office and do not use the telephone until the storm has passed. If high winds occur, move away from the exterior windows. Report the situation to the Project Manager /Site Safety Officer.

The National Weather Service issues severe weather warning including thunderstorm, tornado and winter storm warnings when a high probability of severe weather exists. If a severe weather warning is issued, field work activities will be cancelled.

In the event of a reported flood, severe storm, or tornado and after the risk for personal safety has diminished, the Project Manager should visit and inspect the site. Any unsafe or abnormal conditions should be reported to Detrex immediately.

14.11.

1 -- 3

13.1 TRAINING AND MEDICAL SURVEILLANCE

All URS site personnel will have met the requirements of 29 CFR 1910.120(e), including:

- Forty hours of initial off-site training or its recognized equivalent
- Eight hours of annual refresher training for all personnel (as required)
- Eight hours of supervisor training for personnel serving as Site Safety Officers
- Three days of work activity under the supervision of a trained and experienced supervisor

All URS site personnel are participating in medical surveillance programs that meet the requirements of 29 CFR 1910.120(f). Current copies of training certificates and statements of medical program participation for all URS personnel are maintained by the local office.

In addition, all URS site personnel will review this HSP and sign a copy of the Safety Plan Compliance Agreement, which is found in Attachment B. The PM will maintain these agreements at the site, and place them in the project file at the conclusion of the operation.

Prior to the start of operations at the site, the SSO will conduct a site safety briefing, which will include all personnel involved in site operations. At this meeting, the SSO will discuss:

- Contents of this HSP
- Types of hazards at the site and means for minimizing exposure to them
- The type of monitoring that will be performed
- Action levels for upgrade and downgrade of personal protective equipment
- Personal protective equipment that will be used
- Site-specific respiratory protection requirements
- Decontamination protocol
- Site control measures, including safe operating practices and communication
- Location and use of emergency equipment
- Evacuation signals and procedures

All site personnel, including subcontractor personnel, are to attend the briefings and sign the briefing form.

Subsequent site safety briefings will be conducted at least weekly, or whenever there is a change in task or significant change in task location. Briefings will also be conducted whenever new personnel report to the site.

13.2 SITE INSPECTIONS

The URS Project Manager or Site Safety Officer is to conduct a daily site inspection prior to the start of each shift. It is the responsibility of the Project Manager or Site Manager to resolve discrepancies immediately, contacting the Office Health and Safety Manager and Regional Health and Safety Manager if necessary for assistance. Inspections are to be documented and maintained on site until the completion of the project, at which time will be placed in the project files.

The PM and SSO are responsible for site record keeping. Prior to the start of work, they will review this plan; if there are no changes to be made, they will sign the approval form (PM) or acceptance form (SSO) and forward a copy to the Office Health and Safety Manager.

All URS personnel will review the HSP and sign the Safety Plan Compliance Agreement in Attachment B; copies of these forms will be maintained in the project file as noted in Section 12.

The SSO will conduct a Site Safety Briefing in accordance with Section 13 and have all attendees sign the form in Attachment B; copies will be maintained in the project file.

Any incident or exposure incident will be investigated and the Incident Report form (SMS 049) will be completed and forwarded to the Office Health & Safety Representative and the Regional Health and Safety Manager.

All instrument readings and calibrations, PPE use and changes, health and safety-related issues, and deviations from or problems with this HSP will be recorded in the field log.

TABLE 7-1 COMPONENTS OF PERSONAL PROTECTION LEVELS

Level D Modified Protection

Safety glasses with side shields or goggles

Hard hat

Face shield (optional)

Poly-coated Tyvek coveralls

Hearing protection (as needed)

Inner gloves of snug-fitting latex or vinyl (if handling contaminated materials)

Outer gloves Nitrile (if handling contaminated materials) or /neoprene rubber (as need it)

Steel-toe, steel-shank work boots (neoprene or chemical resistant)

Supplied-air respirator (immediately available)

TABLE 7-1 COMPONENTS OF PERSONAL PROTECTION LEVELS (Continued)

Level B Protection

Hard hat

Poly-coated Tyvek

Inner gloves of snug-fitting latex or vinyl

Outer gloves Fluoroelastomer

(Viton) (if handling contaminated materials)

Steel-toe, steel-shank work boots (neoprene or chemical resistant)

Pressure-demand supplied air respirator

5-minute escape bottle

Two-way radio communications

Taping of gloves and boots to disposable coveralls

TABLE 9-1 ACTION LEVELS DURING SITE ACTIVITIES

Organic Vapors (PID) (ppm)	Responses ¹
< 0.2 Above Background – Point of Operations/Release Source Point (1 min. average)	a) Continue activities.b) Level D modified protection.c) Continuous air monitoring.
>0.2 Above Background – Operators Breathing Zone (1 min. average)	a) Upgrade to Level B protection or evacuate area ¹
Test Pits	
< 1 Above Background – Point of Operations/Release Source Point (1 min. average)	a) Continue activities.b) Level D Modified protection.c) Continuous air monitoring.
> 1 Above Background – Operators Breathing Zone (1 min. average)	a) Evacuate area or upgrade to Level B protection

Notes:

1 The SSO always has the option to cease work and evacuate the area in lieu of upgrading to Level B protection.

TABLE 12-1 DETREX CORPORATION 1100 STATE ROAD ASHTABULA, OHIO

EMERGENCY CONTACTS

	Agency Name (and Ad	dress)		Telephone No.
•	Fire Department	10)	The first of the second of the	911 or 440-997-4641
•	Police Department			911 or 440-992-7172
•	Ashtabula County Medical C 2420 Lake Avenue Ashtabula, Ohio 44004	Center		440-997-6600
•	Miller Outpatient Therapy 456 South Main Street Andover, Ohio 44003			440-293-4226
UF	S Health and Safety Manage	ement and Field	Personnel	
•	Martin Schmidt	Project Manage	r	216-622-2400 After work hours 216-543-2168
•	Anton Heitger / Jerry Kaminski	URS Site Safet	y Officer	216-622-2400
•	Jeanette Schrimsher	URS Occupation	onal Nurse	866-326-7321
•	Cece Weldon	Regional Health Manager	h and Safety	248-553-9449 (Cell) 248-752-3405
•	Tom Steib	Detrex Manage	r	440- 997-6131
Er	Vironmental Protection Age	ncy		
•	Ohio EPA Emergency Resp	onse Unit		800-282-9378
•	Ohio EPA			614-466-8500

APPENDIX A

Constituents of Concern for Health & Safety

CHEMICAL EXPOSURE LIMITS

Chemical Name	1	SHA (ppm)	ACC	TLV GHI (ppm)	LEL %
	TWA	ST	TWA	STE	
Chloroform	None	None	None	None	None
Hexachlorobutadiene	None	None	0.02	None	Unknown
Tetrachloroethene	5	None	1	None	None
1,1,2-Trichloroethane	10	None	10	None	6
1,1,2,2-Tetrachloroethane	None	None	None	None	None
Vinyl Chloride	1	None	None	None	3.5
Trichloroethene	100	None	25	None	8
1,1-Dichloroethene	None	None	None	None	6.5
1,1,1-Trichloroethane	350	None	None	None	7.5
trans-1,2-Dichloroethene	50	None	1	2	6.2
cis-1,2-Dichloroethene					
Hexachlorobenzene	None	None	None	None	None
Polychlorinated biphenyls	None	None	None	None	None
1,1,1,2-Tetrachloroethane	None	None	None	None	unknown

PEL TLV

: Permissible Exposure Limits

ACGIH

TWA

: Threshold Limit Values
: American Conference of Governmental Industrial Hygiene
: (Time-Weighted Average) the average concentration of a chemical to which it is permissible to be exposed for a conventional 8-hour workday and a 40-hour workweek. CNS: Central Nervous System.

ST/STE V

: Short Term exposure (15 minutes) : Vapor and aerosol

CHEMICAL EXPOSURE LIMITS

Chemical Name		SHA (ppm)	ACC	TLV SHI (ppm)	LEL %
	TWA	ST	TWA	STE	
Chloroform	None	None	None	None	None
Hexachlorobutadiene	None	None	0.02	None	Unknown
Tetrachloroethene	5	None	1	None	None
1,1,2-Trichloroethane	10	None	10	None	6
1,1,2,2-Tetrachloroethane	None	None	None	None	None
Vinyl Chloride	1	None	None	None	3.5
Trichloroethene	100	None	25	None	8
1,1-Dichloroethene	None	None	None	None	6.5
1,1,1-Trichloroethane	350	None	None	None	7.5
trans-1,2-Dichloroethene	50	None	1	2	6.2
cis-1,2-Dichloroethene					
Hexachlorobenzene	None	None	None	None	None
Polychlorinated biphenyls	None	None	None	None	None
1,1,1,2-Tetrachloroethane	None	None	None	None	unknown

PEL TLV : Permissible Exposure Limits

: Threshold Limit Values

ACGIH

: American Conference of Governmental Industrial Hygiene
: (Time-Weighted Average) the average concentration of a chemical to which it is permissible to be exposed for a conventional 8-hour workday and a 40-hour workweek. CNS: Central Nervous TWA

System.

ST/STE

: Short Term exposure (15 minutes)

: Vapor and aerosol



U.S. Department of Labor

Occupational Safety & Health Administration



Search

OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: 1,1,1-TRICHLOROETHANE

UN No: 2831 CAS #: 71-55-6 Synonyms: Chlorothene; 1,1,1-Trichloroethane; 1,1,1-Trichloroethane (stabilized)

Formula: C2H3Cl3

Physical Properties	Se		
Physical Description:	Colorless liquid with a mild, chloroform-like odor.	ild, chlorofor	rm-like odor.
BP: 165ºF	MW: 133.4	LEL: 7.5%	LEL: 7.5% NFPA Fire Rating: 1
FRZ/MLT: FRZ: -23°F	VP: 100 mmHg	UEL: 12.5%	NFPA Health Rating: 2
FP: NA	VD: NA		NFPA Reactivity Rating: 0
Sp. GR: 1.34	IP: 11.00 eV		NFPA Sp. Inst.: NA

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: 350	REL-TWA ppm: NA	AIHA Emergency Response Planning
PEL-TWA mg/m3: 1900	REL-TWA mg/m3: NA	Guidelines - ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm: 350	
PEL-C mg/m3: NA	REL-C mg/m3: 1900	Carcinogen Classifications: IARC-3, TLV-A4
Skin Notation: No	Skin Notation: No	
Notes: NA	Notes: 15 MINUTE CEILING	

IDLH Motes: NA		IDLH ppm: 700		
H Pocket Guide to Chemical Hazards (Current through June 2006) yl chloroform sea Trade Names: Chlorothene; 1,1,1-Trichloroethane; 2,1,1,1-Trichloroethane; 3,1,1,1-Trichloroethane; 3,1,1,1-Trichloroethane; 3,1,1,1-Trichloroethane; 3,1,1,1,1-Trichloroethane; 3,1,1,1,1-Trichloroethane; 3,1,1,1,1-Trichloroethane; 3,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1		IDLH mg/m3: NA		
H Pocket Guide to Chemical Hazards (Current through June 2006) yl chloroform a: CH3CCI3 ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 me Linits ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 me Linits ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 me Linits ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane DOT ID & Guide: 2831 ms & Trade Name: 1,1,1-Trichloroethane DOT ID & Guide: 2831 ms & Trade Name: Name Dot ID & March Name DOT ID & Guide: 2831 ms & Trade Name Dot ID & March Name Dot ID & March Name Dot ID & March Name ms & Tracent Name Dot ID & March Name Dot ID & March Name ms & Tracent Name Dot ID & March Name Dot ID & March Name ms & Name Dot ID & March Name Dot ID & March Name ms & Name Dot ID & March Name Dot ID & March Name ms & Name Dot ID & Name Name ms & Name Dot ID &		IDLH Notes: NA		
H Pocket Guide to Chemical Hazards (Current through June 2006) yl chloroform a: CH3CCI3 the Linits Track Names: Chlorothene; 1,1,1-Trichloroethane; 1,1,1-Trichloroethane				
### Strate Names: Chlorothene; 1,1,1-Trichloroethane; 1,1,1-Trichloroethane	NIOSH Pocket Guide	to Chemical Hazards	(Current through June	
a: CH3CCI3 ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane; 1,	Methyl chloroform			CAS: 71-55-6
ms & Trade Names: Chlorothene; 1,1,1-Trichloroethane; 1,1,1-Trichlor	Formula: CH3CCI3			RTECS: KJ2975000
Exposure Limits NIOSH REL: C 350 ppm (1900 mg/m3) [15-minute] See Appendix C (Chloroethanes) IDLH: 700 ppm Physical Description Conversion: 1 ppm = 5.46 mg/m3 PROJECT 1.00 eV RGasD: NA PLP: 7 Sw Combustible Liquid, but burns with difficulty. (See flammable and combustible liquid classes) Incompatibilities & Reactivities Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.] Maesurement Methods NIOSH 1003 Personal Protection & Sanitation First Aid Skin: Soap wash prompt Breati: Resp support Swanlow: When wet or contam Change: N.R. NIOSH Respirator Recommendations NIOSH Respirator Recommendations NIOSH A 700 ppm; SA*SCBAF: SCBAF: PD, PP/SAE: PD, PP/SAE: PC, PP - 12 - 12 - 12 - 12 - 12 - 12 - 12 -	1	Chlorothene; 1,1,1-Trichloroet	hane; 1,1,1-Trichloroethane	
NIOSH REL: C 350 ppm (1900 mg/m3) [15-minute] See Appendix C (Chloroethanes) IDLH: 700 ppm Physical Description Conversion: 1 ppm = 5.46 mg/m3 Physical Description Colorless liquid with a mild, chloroform-like odor. MW: 133.4 BP: 165F RGasD: NA Sp. Gr: 1.34 FRZ: -23F Sp. Gr: 1.34 FRZ: -25% Sp. Gr: 1.34 FRZ:	Exposure Limits			
Physical Description Colorless liquid with a mild, chloroform-like odor. MW: 133.4 PP: 100 eW Els. 12.5% Combustible Liquid, but burns with difficulty. (See flammable and combustible liquid classes) Incompatibilities & Reactivities Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.] Massurement Methods NIOSH 1003 Personal Protection & Sanitation Remove: When wet or contam Remove: NR: NIOSH Respirator Recommendations NIOSH Room: SA*SCBAF: PD, PP: ASCBA Escape; GMFOV/SCBAE	NIOSH REL: C 350 ppm (190 Appendix C (Chloroethanes)	00 mg/m3) [15-minute] See	OSHA PEL: TWA 350 ppm (1	900 mg/m3)
Colorless liquid with a mild, chloroform-like odor. MW: 133.4 PP: 100 mmHg PP: 11.00 eV RGasD: NA Combustible Liquid, but burns with difficulty. (See flammable and combustible liquid classes) Incompatibilities & Reactivities Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.] Massurement Methods NIOSH 1003 Personal Protection & Sanitation Skin: Prevent skin contact Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed Swallow: Medical attention immed Swallow: S	IDLH: 700 ppm		1 ppm =	g/m3
Colorless liquid with a mild, chloroform-like odor. MW: 133.4 PP: 100 mmHg IP: 11.00 eV RGasD: NA FLE. 7.5% Combustible Liquid, but burns with difficulty. (See flammable and combustible liquid classes) Incompatibilities & Reactivities Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.] Measurement Methods NIOSH 1003 Personal Protection & Sanitation Skin: Prevent skin contact Wash skin: When contam Change: N.R. NIOSH Respirator Recommendations	Physical Description			
WP: 133.4 WP: 100 mmHg WP: 100 mmHg PI: 11.00 eV RGasD: NA FI.P: ? Combustible Liquid, but burns with difficulty. (See flammable and combustible liquid classes) Incompatibilities & Reactivities Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.] Measurement Methods NIOSH 1003 Personal Protection & Sanitation Skin: Prevent skin contact Skin: Prevent skin contact Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed (See procedures) NIOSH Respirator Recommendations NIOSH/OSHA 700 pom: SA*/SCBAF: PD, PP/SAF: PD, PP/SACBA Escape; GMFOV/SCBAE		chloroform-like odor.		
VP: 100 mmHg IP: 11.00 eV RGasD: NA Sp.Gr: 1.34 FI.P: ? UEI: 12.5% LEL: 7.5% MEC: NA Combustible Liquid, but burns with difficulty. (See flammable and combustible liquid, classes) MEC: NA Incompatibilities & Reactivities Reactivities Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.] Measurement Methods NIOSH 1003 Personal Protection & Sanitation First Aid Skin: Prevent skin contact Eye: Irr immed Skin: Soap wash prompt Skin: Soap wash prompt Swash skin: When contam Remove: When wet or contam Swallow: Medical attention immed (See procedures) Change: N.R. NIOSH/OSHA 700 ppm: SA*/SCBAF: SCBAF: PD, PP: ASCBA Escape: GMFOV/SCBAE	MW: 133.4	BP: 165F	FRZ: -23F	Sol: 0.4%
FI.P.; ? Combustible Liquid, but burns with difficulty. (See flammable and combustible liquid classes) Incompatibilities & Reactivities Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.] Measurement Methods NIOSH 1003 Personal Protection & Sanitation Skin: Prevent skin contact Skin: Prevent skin contact Skin: Prevent skin contact Skin: Prevent eye contact Wash skin: When contact Change: N.R. NIOSH Respirator Recommendations NIOSH Respirator Recommendations NIOSH ODDM: SA*/SCBAF: SCBAF: PD, PP: ASCBA Escape; GMFOV/SCBAE	VP: 100 mmHg	IP: 11.00 eV	RGasD: NA	Sp.Gr: 1.34
Combustible Liquid, but burns with difficulty. (See flammable and combustible liquid classes) Incompatibilities & Reactivities Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.] Measurement Methods NIOSH 1003 Personal Protection & Sanitation Skin: Prevent skin contact Skin: Prevent skin contact Wash skin: When contam Remove: When wet or contam Change: N.R. NIOSH Respirator Recommendations NIOSH/OSHA 700 ppm; SA*/SCBAF : SCBAF:PD,PP/SAF:PD,PP/SCBAE Escape: GMFOV/SCBAE	FI.P: ?	UEL: 12.5%	LEL: 7.5%	MEC: NA
Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.] Measurement Methods NIOSH 1003 Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent skin contact Wash skin: When contact Wash skin: When wet or contam Remove: When wet or contam Change: N.R. NIOSH Respirator Recommendations NIOSH Respirator Recommendations NIOSH/OSHA 700 ppm; SA*/SCBAF: SCBAF: PD, PP/SAF: PD, PP-SASCBA Escape: GMFOV/SCBAE	Combustible Liquid, but burn	ns with difficulty. (See flamma	ble and combustible liquid clas	ses)
Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.] Measurement Methods NIOSH 1003 Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. NIOSH Respirator Recommendations NIOSH Respirator Recommendations NIOSH/OSHA 700 ppm: SA*/SCBAF: SCBAF: PD, PP: ASCBA Escape: GMFOV/SCBAE	Incompatibilities & Reacti	ivities		
Measurement MethodsNIOSH 1003Personal Protection & SanitationFirst AidSkin: Prevent skin contact Eyes: Prevent skin: When contact Wash skin: When contact Wash skin: When wet or contam 	Strong caustics; strong oxidi potassium; water [Note: Rea	izers; chemically-active metals acts slowly with water to form	s such as zinc, aluminum, mag hydrochloric acid.]	nesium powders, sodium &
Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. NIOSH Respirator Recommendations NIOSH/OSHA 700 ppm; SA*/SCBAF: SCBAF:PD,PP/SAF:PD,P	Measurement Methods			
Personal Protection & SanitationFirst AidSkin: Prevent skin contactEye: Irr immedEyes: Prevent eye contactSkin: Soap wash promptWash skin: When contamSwallow: Medical attention immedRemove: When wet or contam(See procedures)Change: N.R.(See procedures)NIOSH Respirator RecommendationsNIOSH/OSHA 700 ppm: SA*/SCBAF: SCBAF: PD, PP/SAF: P	NIOSH 1003			
Skin: Prevent skin contact Eyes: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. NIOSH Respirator Recommendations NIOSH/OSHA 700 ppm: SA*/SCBAF: SCBAF: PD, PP/SAF: PD, PP	Personal Protection & San	nitation	First Aid	
Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. NIOSH Respirator Recommendations NIOSH/OSHA 700 ppm: SA*/SCBAF: SCBAF: PD, PP/SAF:	Skin: Prevent skin contact		Eye: Irr immed	
Remove: When wet or contam Change: N.R. NIOSH Respirator Recommendations NIOSH/OSHA 700 ppm: SA*/SCBAF: PD, PP/SAF: PD, PP/SAF Escape: GMFOV/SCBAE	Eyes: Prevent eye contact Wash skin: When contam		Skin: Soap wash prompt Breath: Resp support	
Change: N.R. NIOSH Respirator Recommendations NIOSH/OSHA 700 ppm: SA*/SCBAF: SCBAF: PD, PP/SAF: PD, PP: ASCBA Escape: GMFOV/SCBAE	Remove: When wet or conta	Ē	Swallow: Medical attention in	nmed
NIOSH/OSHA 700 ppm: SA*/SCBAF: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Change: N.R.		(See <u>procedures)</u>	
NIOSH/OSHA 700 ppm: SA*/SCBAF: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	NIOSH Respirator Recomi	mendations		
	NIOSH/OSHA 700 ppm: SA*	/SCBAF: SCBAF:PD,PP/SAF:P	D,PP:ASCBA Escape: GMFOV/9	SCBAE

(See symbols and codes)
Exposure Routes
Inh Ing Con
Symptoms
Irrit eyes, skin; head, lass, CNS depres, poor equi; derm; card arrhy; liver damage (See abbreviations)
Target Organs
Eyes, skin, CNS, CVS, liver (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004) **Guide Number: 160**

160 Halogenated Solvents

POTENTIAL HAZARDS

HEALTH

- Vapors may cause dizziness or suffocation.
- Exposure in an enclosed area may be very harmful.
 - Contact may irritate or burn skin and eyes.
- Fire may produce irritating and/or toxic gases.
- Runoff from fire control or dilution water may cause pollution.

OR EXPLOSION FIRE

- Some of these materials may burn, but none ignite readily. Most vapors are heavier than air.
 - Air/vapor mixtures may explode when ignited.
 - Container may explode in heat of fire.

PUBLIC SAFETY

- CALL Emergency Response Telephone Number on Shipping Paper first. If
 - Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- Isolate spill or leak area immediately for at least 25 to 50 meters
 - (80 to 160 feet) in all directions.
- Keep unauthorized personnel away.
 - Stay upwind.
- Many gases are heavier than air and will spread along ground and
 - collect in low or confined areas (sewers, basements, tanks).
 - Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
 - Structural firefighters' protective clothing will only provide limited protection,

EVACUATION

Large Spill

Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Small Fires

Dry chemical, CO2 or water spray.

Large Fires

- Dry chemical, CO2, alcohol-resistant foam or water spray.
- Move containers from fire area if you can do it without risk.
- Dike fire control water for later disposal; do not scatter the

material.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK * FITMINATE

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
 - Stop leak if you can do it without risk.

- Take up with sand, earth or other noncombustible absorbent material. Small Liquid Spills
 - Large Spills
- Dike far ahead of liquid spill for later disposal.
- Prevent entry into waterways, sewers, basements or confined areas.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
 - Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.

r ago 5 or o

- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
 - For minor skin contact, avoid spreading material on unaffected skin.
 - Wash skin with soap and water.
 - Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

iquid with fly ash, cement powder, or commercial sorbents. Water spill: Use natural barriers or oil spill control booms to iquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk imit spill travel. Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. personnel hazard. Use water spray to knock-down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain Non-fire Spill Response: Keep material out of water sources and sewers. Attempt to stop leak if without undue Remove trapped material with suction hoses. (AAR, 1999)

possible. Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with Firefighting: Cool all affected containers with flooding quantities of water. Apply water from as far a distance as difficulty.) Keep run-off water out of sewers and water sources. (AAR, 1999)

hot metal or on exposure to ultraviolet radiation, it will decompose to form irritant gases. A cobalt/molybdenum-alumina hours under normal lab conditions.REACTIVITY: This chemical decomposes in the presence of chemically active metals. with sodium hydroxide. It is incompatible with strong oxidizers and strong bases. Mixtures with potassium or its alloys Reactivity: STABILITY: This chemical is hygroscopic. It is oxidized by atmospheric oxygen at high temperatures. It is reactive to sunlight at high altitudes. Solutions of this chemical in anhydrous DMSO or ethanol should be stable for 24 catalyst will generate a substantial exotherm on contact with its vapor at ambient temperatures. Hazardous reactions hydroxide, and with chlorine in sunlight. It will attack some forms of plastics, rubber and coatings. Upon contact with are shock-sensitive and may explode on light impact. This chemical can react with an aqueous suspension of calcium oxygen, sodium and sodium-potassium alloys. It will also react violently with acetone, zinc and nitrates. It can react This includes aluminum, magnesium and their alloys. It will react violently with dinitrogen tetraoxide, oxygen, liquid also occur with (aluminum oxide + heavy metals). (NTP, 1992)

or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY :MMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or

advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being center, IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992) aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control

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Occupational Safety & Health Administration

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OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: VINYLIDENE CHLORIDE

UN No: 1303 CAS #: 75-35-4

Synonyms: 1,1-DCE; 1,1-Dichloroethene; 1,1-Dichloroethylene; VDC; Vinylidene chloride monomer; Vinylidene chloride, inhibited; Vinylidene dichloride Formula: C2H2Cl2

Physical Properties	Se		
Physical Description:	Colorless liquid or gas (a	above 89°F)	Physical Description: Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor.
BP: 89ºF	MW: 96.9	LEL: 6.5%	LEL: 6.5% NFPA Fire Rating: 4
FRZ/MLT: FRZ: - 1890F	VP: 500 mmHg	UEL: 15.5%	NFPA Health Rating: 2
FP: -20F	VD: NA		NFPA Reactivity Rating: 2
Sp. GR: 1.21	IP: 10.00 eV		NFPA Sp. Inst.: NA

Exposure Limits		
ОЅНА	NIOSH	Related Information
PEL-TWA ppm: NA	REL-TWA ppm: NA	AIHA Emergency Response Planning
PEL-TWA mg/m3: NA	REL-TWA mg/m3: NA	Guidelines - ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: IARC-3, NIOSH-
Skin Notation: No	Skin Notation: No	Ca, TLV-A4
	Notes: CARCINOGEN (Ca);	

Notes: NA	REDUCE EXPOSURE TO LOWEST FEASIBLE CONCENTRATION (LOQ 0.4 ppm)	
	IDLH mg/m3: NA IDLH Notes: Ca	

NIOSH Pocket Guide	ide to Chemical Hazards (Current through June 2006)	(Current through June	= 2006)
Vinylidene chloride			CAS: 75-35-4
Formula: CH2=CCl2			RTECS: KV9275000
Synonyms & Trade Names: 1,1-DCE; 1,1-Dichloroe Vinylidene chloride monomer; Vinylidene dichloride	nes: 1,1-DCE; 1,1-Dichloroethene; 1,1-Dichloroethylene; VDC; omer; Vinylidene dichloride	1,1-Dichloroethylene; VDC;	DOT ID & Guide: 1303 130P (inhibited)
Exposure Limits			
NIOSH REL: Ca See Appendix A	x A	OSHA PEL : none	
IDLH: Ca [N.D.]		Conversion: NA	
Physical Description			
Colorless liquid or gas (above	above 89F) with a mild, sweet, chloroform-like odor.	roform-like odor.	
MW: 96.9	BP: 89F	FRZ: -189F	Sol: 0.04%
VP: 500 mmHg	IP: 10.00 eV	RGasD: NA	Sp.Gr: 1.21
FI.P: -2F	UEL: 15.5%	LEL: 6.5%	MEC: NA
Class IA Flammable Liquid (S	uid (See flammable and combustible liquid classes)	e liquid classes)	
Incompatibilities & Reactiv	eactivities		
Aluminum, sunlight, air, copp acid, or oleum. Inhibitors suc	copper, heat [Note: Polymerization may occur if exposed to oxidizers, chlorosulfonic acs such as the monomethyl ether of hydroquinone are added to prevent polymerization.]	n may occur if exposed to oxic hydroquinone are added to p	copper, heat [Note: Polymerization may occur if exposed to oxidizers, chlorosulfonic acid, nitrics such as the monomethyl ether of hydroquinone are added to prevent polymerization.]
Measurement Methods			
NIOSH 1015; OSHA 19			
Personal Protection & Sanitation	itation	First Aid	
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet (flamm) Change: N.R. Provide: Eyewash, Quick drench	nch	Eye: Irr immed Skin: Soap flush immed Breath: Resp support Swallow: Medical attention immed (<u>See procedures</u>)	nmed

NIOSH Respirator Recommendations
NIOSH: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE (See symbols and codes)
Exposure Routes
Inh Abs Ing Con
Symptoms
Irrit eyes, skin, throat; dizz, head, nau, dysp; liver, kidney dysfunc; pneuitis; [carc] (See abbreviations)
Target Organs
Eyes, skin, resp sys, CNS, liver, kidneys (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 129P

129 Flammable Liquids (Polar/Water-Miscible/Noxious) POTENTIAL HAZARDS

FIRE OR EXPLOSION

- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air.
 - Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and
 - collect in low or confined areas (sewers, basements, tanks).
- Those substances designated with a P may polymerize explosively when Vapor explosion hazard indoors, outdoors or in sewers.
 - heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
 - Containers may explode when heated. Many liquids are lighter than water;

HEALTH

- May cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with material may irritate or burn skin and eyes.
 - Fire will produce irritating, corrosive and/or toxic gases.
 - Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate

elephone number listed on the inside back cover.

Isolate spill or leak area immediately for at least 50 to 100 meters

Keep unauthorized personnel away. (160 to 330 feet) in all directions.

Stay upwind.

Keep out of low areas.

Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

Wear positive pressure self-contained breathing apparatus (SCBA).

Structural firefighters' protective clothing will only provide limited protection,

EVACUATION

Large Spill

Consider initial downwind evacuation for at least 300 meters

(1000 feet) Fire

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial

evacuation for 800 meters (1/2 mile) in all directions. **EMERGENCY RESPONSE**

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fires

Dry chemical, CO2, water spray or alcohol-resistant foam.

Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane.

arge

Water spray, fog or alcohol-resistant foam.

Do not use straight streams.

Move containers from fire area if you can do it without risk. Fire involving Tanks or Car/Trailer Loads

Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

Cool containers with flooding quantities of water until well after fire is out.

Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

ALWAYS stay away from tanks engulfed in fire.

For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

ELIMINATE all ignition sources (no smoking, flares, sparks or flames

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- in immediate area).
- All equipment used when handling the product must be grounded.
 - * Do not touch or walk through spilled material.
 - Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
 - A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spills

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
 - Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
 - Wash skin with soap and water.
 - Wash skin with soap and water. Keep victim warm and quiet.
- * Effects of exposure (inhalation, ingestion or skin contact) to
 - substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

conditions. First responders at the scene of a dangerous goods incident should seek additional specific information about, accompanying the shipping document, may be more specific and accurate than this guidebook in providing guidance for The letter P following the guide number identifies those materials which present a polymerization hazard under certain response agency, the emergency response number on the shipping document, or by consulting the information on or any material in question as soon as possible. The information received by contacting the appropriate emergency the materials involved.

Additional Emergency Response Information (CAMEO Data)

and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed spray to knock-down vapors. Combustion products include corrosive or toxic vapors. Land spill: Dig a pit, pond, lagoon, concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Apply approriate foam to diminish vapor and fire hazard. Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. Inject "universal" gelling agent to solidify encircled spill and increase effectiveness of booms. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999) Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. (AAR, 1999)

(Bretherick 1979, p. 160, 187). Mixing vinylidene chloride in equal molar portions in a closed container with any of the following substances caused the temperature and pressure to increase:chlorosulfonic acid, nitric acid, or oleum (NFPA Reactivity: CHEMICAL PROFILE: Peroxidizable monomer may initiate exothermic polymerization of the bulk material 1991). (REACTIVITY, 1999)

known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. of exposure. (NTP, 1992)

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OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: VINYL CHLORIDE

CAS #: 75-01-4

UN No: 1086

Formula: C2H3Cl

Synonyms: Chloroethene; Chloroethylene; Ethylene monochloride; Monochloroethene; Monochloroethylene; VC; Vinyl chloride monomer (VCM)

Physical Properties	Se		
Physical Description: Colorles as a liquefied compressed gas.]	Colorless gas or liquid (t ed gas.]	oelow 7ºF) w	Physical Description: Colorless gas or liquid (below 7ºF) with a pleasant odor at high concentrations. [Note: Shipped as a liquefied compressed gas.]
BP: 70F	MW: 62.5	LEL: 3.6%	LEL: 3.6% NFPA Fire Rating: 4
FRZ/MLT: FRZ: - 256ºF	VP: 3.3 atm	UEL: 33.0%	NFPA Health Rating: 2
FP: NA (Gas)	VD: 2.21		NFPA Reactivity Rating: 2
Sp. GR: NA	IP: 9.99 eV		NFPA Sp. Inst.: NA

Exposure Limits		
ОЅНА	NIOSH	Related Information
PEL-TWA ppm: 1	REL-TWA ppm: NA	AIHA Emergency Response Planning
PEL-TWA mg/m3: NA	REL-TWA mg/m3: NA	Guidelines - ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: 5	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: IARC-1, NIOSH-
Skin Notation: No	Skin Notation: No	Ca, NTP-K, OSHA-Ca,TLV-A1

IDLH ppm: NA IDLH mg/m3: NA IDLH Notes: Ca	Notes: SEE 29 CFR 1910.1017; 5 ppm IS THE AVERAGE CONCENTRATION THAT MUST NOT FEASIBLE CONCENTRATION, USE PERIOD NOT EXCEED 15 MINUTES 29 CFR 1910.1017	Notes: CARCINOGEN (Ca); REDUCE EXPOSURE TO LOWEST FEASIBLE CONCENTRATION, USE 29 CFR 1910.1017	
IDLH mg/m3: NA IDLH Notes: Ca		IDLH ppm: NA	
IDLH Notes: Ca		IDLH mg/m3: NA	
The state of the s		IDLH Notes: Ca	

NIOSH Pocket Guide	to Chemical Hazards	NIOSH Pocket Guide to Chemical Hazards (Current through June 2006)	e 2006)
Vinyl chloride			CAS: 75-01-4
Formula: CH2=CHCI			RTECS: KU9625000
Synonyms & Trade Names: Monochloroether,	Synonyms & Trade Names: Chloroethene, Chloroethylene, Ethylene monochloride, Monochloroethene, Monochloroethylene, VC, Vinyl chloride monomer (VCM)	, Ethylene monochloride, e monomer (VCM)	DOT ID & Guide: 1086 116P (inhibited)
Exposure Limits			
NIOSH REL: Ca See Appendix A	×Α	OSHA PEL: [1910.1017] TWA 1 ppm C	1 ppm C 5 ppm [15-minute]
IDLH: Ca [N.D.]		Conversion: 1 ppm = 2.56 mg/m	g/m3
Physical Description			
Colorless gas or liquid (belov gas.]	$^{\prime\prime}$ 7F) with a pleasant odor at	high concentrations, [Note: Sh	below 7F) with a pleasant odor at high concentrations. [Note: Shipped as a liquefied compressed
MW: 62.5	BP: 7F	FRZ: -256F	Sol(77F): 0.1%
VP: 3.3 atm	IP: 9.99 eV	RGasD: 2.21	SG: NA
FI.P: NA (Gas)	UEL: 33.0%	LEL: 3.6%	MEC: NA
Flammable Gas (See flamma	Flammable Gas (See flammable and combustible liquid classes)	(5855)	
Incompatibilities & Reactivities	ivities		
Copper, oxidizers, aluminum inhibitors such as phenol. Att), peroxides, iron, steel [Note: tacks iron & steel in presence	Copper, oxidizers, aluminum, peroxides, iron, steel [Note: Polymerizes in air, sunlight, or heat unless stabilized by inhibitors such as phenol. Attacks iron & steel in presence of moisture.]	r heat unless stabilized by
Measurement Methods			
NIOSH 1007; OSHA 4, 75			
Personal Protection & San	Sanitation	First Aid	
Skin: Frostbite Eyes: Frostbite Wash skin: N.R.		Eye: Frostbite Skin: Frostbite Breath: Resp support	

Remove: When wet (flamm) Change: N.R. Provide: Frostbite	(See procedures)
NIOSH Respirator Recommendations	
NIOSH: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE (See symbols and codes)	JBAE JBAE
Exposure Routes	
Inh Con (liquid)	
Symptoms	
Weak; abdom pain, GI bleeding; enlarged liver; pallor or cyan of extremities; liquid: frostbite; [carc] (See abbreviations)	an of extremities; liquid: frostbite; [carc]
Target Organs	
Liver, CNS, blood, resp sys, lymphatic sys (See abbreviations)	

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 116P

116 Gases - Flammable (Unstable) POTENTIAL HAZARDS

FIRE OR EXPLOSION

- EXTREMELY FLAMMABLE.
- Will be easily ignited by heat, sparks or flames.
 - Will form explosive mixtures with air.
- Silane will ignite spontaneously in air.
- Those substances designated with a P may polymerize explosively when
- heated or involved in a fire. Vapors from liquefied gas are initially heavier than air and spread
 - along ground. Vapors may travel to source of ignition and flash back.
 - Containers may explode when heated.
 - Ruptured cylinders may rocket.

HEALTH

- Vapors may cause dizziness or asphyxiation without warning.
 - Some may be toxic if inhaled at high concentrations.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
 - Fire may produce irritating and/or toxic gases.

PUBLIC SAFETY

- CALL Emergency Response Telephone Number on Shipping Paper first. If
 - Shipping Paper not available or no answer, refer to appropriate
 - telephone number listed on the inside back cover,
- Isolate spill or leak area immediately for at least 100 meters
 - (330 feet) in all directions.
- Keep unauthorized personnel away.
 - Stay upwind.
- Many gases are heavier than air and will spread along ground and
 - collect in low or confined areas (sewers, basements, tanks).
 - Keep out of low areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited

protection.

EVACUATION Coll

- Large Spill
- Consider initial downwind evacuation for at least 800 meters
- (1/2 mile).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial
 - evacuation for 1600 meters (1 mile) in all directions.

EMERGENCY RESPONSE

FIRE

- DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.
 - Small Fires
- Dry chemical or CO2.

Large Fires

- Water spray or fog.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Do not direct water at source of leak or safety devices; icing may
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank,
 - * ALWAYS stay away from tanks engulfed in fire.
- * For massive fire, use unmanned hose holders or monitor nozzles; if this
 - is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
 - All equipment used when handling the product must be grounded.
 - Stop leak if you can do it without risk.
- Do not touch or walk through spilled material.
 - Do not direct water at spill or source of leak.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- If possible, turn leaking containers so that gas escapes rather than liquid.
- Prevent entry into waterways, sewers, basements or confined areas.
 - Isolate area until gas has dispersed.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with liquefied gas, thaw frosted parts with
 - lukewarm water
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

conditions. First responders at the scene of a dangerous goods incident should seek additional specific information about accompanying the shipping document, may be more specific and accurate than this guidebook in providing guidance for The letter **P** following the guide number identifies those materials which present a polymerization hazard under certain response agency, the emergency response number on the shipping document, or by consulting the information on or any material in question as soon as possible. The information received by contacting the appropriate emergency the materials involved.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. (AAR, 1999)

affected containers with flooding quantities of water. Apply water from as far a distance as possible. (AAR, 1999) Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Cool all

bulk material (Handling Chemicals Safely 1980.. p. 958; Bretherick 1979. p. 160); with air, it forms polymeric peroxides Reactivity: CHEMICAL PROFILE: Light sensitive, peroxidizable monomer may initiate exothermic polymerization of the

which are explosive (Bretherick 1979. p. 164). An unstable polyperoxide is formed in vinyl chloride through oxidation by atmospheric oxygen in the presence of any of a variety of catalysts. Storage under these conditions for long periods ncreases the concentration of the polyperoxides to hazardous levels (MCA Case History 1551. 1969). (REACTIVITY,

known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects NGESTION: This compound is a gas, therefore inhalation is the first route of exposure. OTHER: Since this chemical is a transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be necessary. Remove the victim from the source of contamination, IMMEDIATELY wash affected areas gently with COLD towels. If symptoms such as inflammation or irritation develop, IMMEDIATELY call a physician or go to a hospital for a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, water (and soap, if necessary) while removing and isolating all contaminated clothing. Dry carefully with clean, soft CAUTION: Exposure of skin to compressed gases may result in freezing of the skin. Treatment for frostbite may be shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. of exposure, (NTP, 1992)

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OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: TRICHLOROETHYLENE

CAS #: 79-01-6

Synonyms: Ethylene trichloride; TCE; Trichloroethene; Trilene **UN No: 1710**

Formula: C2HCl3

Physical Properties	35		
Physical Description:	Colorless liquid (unless o	dyed blue) w	Physical Description: Colorless liquid (unless dyed blue) with a chloroform-like odor.
вр: 1890F	MW: 131.4	LEL: (77ºF): 8%	NFPA Fire Rating: 2
FRZ/MLT: FRZ: -990F	VP: 58 mmHg	UEL: (77ºF): 10.5%	NFPA Health Rating: 2
FP: NA	VD: NA		NFPA Reactivity Rating: 0
Sp. GR: 1.46	IP: 9.45 eV		NFPA Sp. Inst.: NA

Exposure Limits		
ОЅНА	HSOIN	Related Information
PEL-TWA ppm: 100	REL-TWA ppm: 25	AIHA Emergency Response Planning
PEL-TWA mg/m3: NA	REL-TWA mg/m3: NA	Guidelines - ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: 200	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: 2	Carcinogen Classifications: IARC-2A,
		NIOSH-Ca, TLV-A5, NTP-R

	Solution in Notation in No.
Skill Notation. NO	Skill Notation: NO
Notes: PEAK = 300 ppm FOR A 5	
	EXPOSURE TO WASTE
TOOKS.	ANESTHETIC GASES
	IDLH ppm: 1000
	IDLH mg/m3: NA
	IDLH Notes: Ca

NIOSH Pocket Guide	NIOSH Pocket Guide to Chemical Hazards (Current through June 2006)	(Current through June	2006)
Trichloroethylene			CAS: 79-01-6
Formula: CICH=CCI2			RTECS: KX4550000
Synonyms & Trade Names: E	Synonyms & Trade Names: Ethylene trichloride, TCE, Trichloroethene, Trilene	loroethene, Trilene	DOT ID & Guide: 1710 160
Exposure Limits			
NIOSH REL: Ca See Appendix	endix A See Appendix C	OSHA PEL: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)	200 ppm 300 ppm (5-minute s)
IDLH: Ca [1000 ppm]		Conversion: 1 ppm = 5.37 mg/m	g/m3
Physical Description			
Colorless liquid (unless dyed	dyed blue) with a chloroform-like odor.	dor.	
MW: 131.4	BP: 189F	FRZ: -99F	Sol: 0.1%
VP: 58 mmHg	IP: 9.45 eV	RGasD: NA	Sp.Gr: 1.46
FI.P: ?	UEL(77F): 10.5%	LEL(77F): 8%	MEC: NA
Combustible Liquid, but burns	burns with difficulty. (See flammable and combustible liquid classes)	ile and combustible liquid clas	ses)
Incompatibilities & Reactiv	eactivities		
Strong caustics & alkalis; che	mically-active metals (such as	s barium, lithium, sodium, ma	Strong caustics & alkalis; chemically-active metals (such as barium, lithium, sodium, magnesium, titanium & beryllium)
Measurement Methods			
NIOSH 1022, 3800; OSHA 1001	1001		
Personal Protection & Sani	Sanitation	First Aid	
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R.	F	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed (See procedures)	med

Provide: Eyewash, Quick drench
NIOSH Respirator Recommendations
NIOSH:SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE (See symbols and codes)
Exposure Routes
Inh Abs Ing Con
Symptoms
Irrit eyes, skin; head, verti; vis dist, ftg, gidd, tremor, som, nau, vomit; derm; card arrhy, pares; liver inj; [carc] (See abbreviations)
Target Organs
Eyes, skin, resp sys, heart, liver, kidneys, CNS (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 160

160 Halogenated Solvents

POTENTIAL HAZARDS

HEALTH

- Vapors may cause dizziness or suffocation.
- Exposure in an enclosed area may be very harmful.
- Contact may irritate or burn skin and eyes.
- Fire may produce irritating and/or toxic gases. Runoff from fire control or dilution water may cause pollution.

FIRE OR EXPLOSION

- Some of these materials may burn, but none ignite readily. Most vapors are heavier than air.
- Air/vapor mixtures may explode when ignited.
 - Container may explode in heat of fire.

PUBLIC SAFETY

- CALL Emergency Response Telephone Number on Shipping Paper first. If
 - Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- Isolate spill or leak area immediately for at least 25 to 50 meters '80 to 160 feet) in all directions.
- Keep unauthorized personnel away.
 - Stay upwind.
- Many gases are heavier than air and will spread along ground and

collect in low or confined areas (sewers, basements, tanks).

Keep out of low areas.

Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

Wear positive pressure self-contained breathing apparatus (SCBA).

Structural firefighters' protective clothing will only provide limited protection,

EVACUATION

Large Spill

Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial

evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Small Fires

Dry chemical, CO2 or water spray.

Large Fires

Dry chemical, CO2, alcohol-resistant foam or water spray.

Move containers from fire area if you can do it without risk,

Dike fire control water for later disposal; do not scatter the

material. Fire

involving Tanks or Car/Trailer Loads

Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety

devices or discoloration of tank.

ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).

Stop leak if you can do it without risk.

Small Liquid Spills

Take up with sand, earth or other noncombustible absorbent material.

Large Spills

Dike far ahead of liquid spill for later disposal,

Prevent entry into waterways, sewers, basements or confined areas.

FIRST AID

Move victim to fresh air.

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- Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
 - * Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with
 - running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
 - * Wash skin with soap and water.
 - Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved,

and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Apply water spray or mist to knock down vapors. Combustion products include corrosive or toxic vapors. Land spill: Dig with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Water spill: If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Remove trapped material a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed Non-fire Spill Response: Keep material out of water sources and sewers. Build dikes to contain flow as necessary

Firefighting: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) (AAR, 1999)

trichloroethylene, or tetrachloroethylene can detonate (ASESB Pot. Incid. 39. 1968; Chem. Eng. News 46(9):38. 1968) shown that granular barium in contact with monofluorotrichloromethane, trichlorotrifluoroethane, carbon tetrachloride, trichloroethylene will flash or spark on heavy impact (ASESB Pot. Incid. 39. 1968). A mixture of powdered magnesium with trichloroethylene or with carbon tetrachloride will flash or spark under heavy impact (ASESB Pot. Incid, 39. 1968). and a number of halogenated hydrocarbons possess an explosive capability. Specifically, impact sensitivity tests have Reactivity: CHEMICAL PROFILE: It has been determined experimentally that mixtures of finely divided barium metal It has been determined experimentally that a mixture of beryllium powder with carbon tetrachloride or with REACTIVITY, 1999)

transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper

known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. of exposure. (NTP, 1992)

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OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: ETHYLENE DICHLORIDE

UN No: 1184 CAS #: 107-06-2 Synonyms: 1,2-Dichloroethane; Ethylene chloride; Glycol dichloride

Formula: C2H4Cl2

Physical Properties	Si		
Physical Description: Co acidic & darkens in color.]	Colorless liquid with a pl	easant, chlor	Physical Description: Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.]
BP: 182ºF	MW: 99.0	CEL: 6.2%	LEL: 6.2% NFPA Fire Rating: 3
FRZ/MLT: FRZ: -32°F VP: 64 mmHg	VP: 64 mmHg	UEL: 16%	UEL: 16% NFPA Health Rating: 2
FP: 56ºF	VD: NA		NFPA Reactivity Rating: 0
Sp. GR: 1.24	IP: 11.05 eV		NFPA Sp. Inst.: NA

Exposure Limits		
ОЅНА	NIOSH	Related Information
PEL-TWA ppm: 50	REL-TWA ppm: 1	AIHA Emergency Response Planning
PEL-TWA mg/m3: NA	REL-TWA mg/m3: 4	Guidelines - ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: 2	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: 8	
PEL-C ppm: 100	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: IARC-2B,
Skin Notation: No	Skin Notation: No	NIOSH-Ca, NTP-R, TLV-A4
Notes: PEAK = 200 ppm FOR A 5 MINUTE INTERVAL DURING ANY 3	Notes: CARCINOGEN (Ca)	

HOURS		
	IDLH ppm: 50	
9 9	IDLH mg/m3: NA	
	IDLH Notes: Ca	

NIOSH Pocket Guide t	to Chemical Hazards (de to Chemical Hazards (Current through June 2006)	2006)
Ethylene dichloride			CAS: 107-06-2
Formula: CICH2CH2CI			RTECS: KI0525000
Synonyms & Trade Names: 1,	1,2-Dichloroethane; Ethylene chloride;	hloride; Glycol dichloride	DOT ID & Guide: 1184 131
Exposure Limits			
NIOSH REL: Ca TWA 1 ppm (4 mg/m3) ST 2 ppm (8 mg/m3) See Appendix A See Appendix C (Chloroetha	om (4 mg/m3) ST 2 ppm (8 See Appendix C (Chloroethanes)	OSHA PEL : TWA 50 ppm C 100 ppm 200 ppm [5-minute maximum peak in any 3 hours]	00 ppm 200 ppm [5-minute s]
IDLH: Ca [50 ppm]		Conversion: $1 \text{ ppm} = 4.05 \text{ mg/m3}$	g/m3
Physical Description			
Colorless liquid with a pleasant,	nt, chloroform-like odor. [Note: Decomposes	: Decomposes slowly, become	slowly, becomes acidic & darkens in color.]
MW: 99.0	BP: 182F	FRZ: -32F	%6:0 :loS
VP: 64 mmHg	IP: 11.05 eV	RGasD: NA	Sp.Gr: 1.24
FI.P: 56F	UEL: 16%	LEL: 6.2%	MEC: NA
Class IB Flammable Liquid (Se	d (See flammable and combustible liquid classes)	liquid classes)	
Incompatibilities & Reactivities	vities		
Strong oxidizers & caustics; c liquid ammonia [Note: Decom	Strong oxidizers & caustics; chemically-active metals such as magnesium iquid ammonia [Note: Decomposes to vinyl chloride & HCl above 1112F.	Strong oxidizers & caustics; chemically-active metals such as magnesium or aluminum powder, sodium & potassium; liquid ammonia [Note: Decomposes to vinyl chloride & HCl above 1112F.]	owder, sodium & potassium;
Measurement Methods			
NIOSH 1003; OSHA 3			
Personal Protection & Sani	Sanitation	First Aid	
Skin: Prevent skin contact		Eye: Irr immed	
Eyes: Prevent eye contact Wash skin: When contam		Skiii: Soap Wasii proliipt Breath: Resp support	
Remove: When wet (flamm)		Swallow: Medical attention immed	ımed
Change: N.R.		(See procedures)	
Provide: Eyewash, Quick drench	ıch		
NIOSH Respirator Recomm	mmendations		

NIOSH: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE (See symbols and codes)
Exposure Routes
Inh Ing Abs Con
Symptoms
Irrit eyes, corn opac; CNS depres; nau, vomit; derm; liver, kidney, CVS damage; [carc] (See abbreviations)
Target Organs
Eyes, skin, kidneys, liver, CNS, CVS (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004) 129 Flammable Liquids (Polar/Water-Miscible/Noxious) POTENTIAL HAZARDS FIRE OR EXPLOSION **Guide Number: 129**

- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
 - Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
 - Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a P may polymerize explosively when Runoff to sewer may create fire or explosion hazard, heated or involved in a fire.
 - Containers may explode when heated. Many liquids are lighter than water.

HEALTH

- May cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
 - Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate
 - Isolate spill or leak area immediately for at least 50 to 100 meters telephone number listed on the inside back cover.

- (160 to 330 feet) in all directions.
 - Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
 - Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

Consider initial downwind evacuation for at least 300 meters (1000 feet)

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial
 - evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Fires

Small

- Dry chemical, CO2, water spray or alcohol-resistant foam.
- Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane,

Large

- Water spray, fog or alcohol-resistant foam.
 - Do not use straight streams.
- Move containers from fire area if you can do it without risk. Fire involving Tanks or Car/Trailer Loads

Fight fire from maximum distance or use unmanned hose holders or

monitor nozzles.

- Cool containers with flooding quantities of water until well after
- Withdraw immediately in case of rising sound from venting safety
 - ALWAYS stay away from tanks engulfed in fire. devices or discoloration of tank.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area)
 - All equipment used when handling the product must be grounded.

- Do not touch or walk through spilled material.
 - Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
 - Use clean non-sparking tools to collect absorbed material.

Large Spills

- Dike far ahead of liquid spill for later disposal,
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
 - Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes,
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
 - Wash skin with soap and water.
 - Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to
 - substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water nolding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concentration, apply activated carbon at ten times the spilled amount. Remove trapped material with suction hoses. Use Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources spray to knock-down vapors. Combustion products include corrosive or toxic vapors. Land spill: Dig a pit, pond, lagoon, mmobilize spill. Apply approriate foam to diminish vapor and fire hazard. Water spill: Use natural deep water pockets, concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Apply "universal" gelling agent to excavated lagoons, or sand bag barriers to trap material at bottom. If dissolved, in region of 10 ppm or greater mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may spread fire. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Liquid ammonia and ethylene dichloride can cause an explosion when mixed, NFPA 491M, 1991. A tank of dimethyl amino propyl amine exploded violently when it reacted with wet ethylene dichloride

which had been the tanks previous contents, Doyle(1973). (REACTIVITY, 1999)

known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital, OTHER: Since this chemical is a mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or MMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. of exposure. (NTP, 1992)

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OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: TETRACHLOROETHANE

CAS #: 79-34-5

Synonyms: Acetylene tetrachloride; Symmetrical tetrachloroethane

UN No: 1702

Formula: C2H2Cl4

Physical Propertie	se		
Physical Description:	Colorless to pale-yellow	liquid with a	Physical Description: Colorless to pale-yellow liquid with a pungent, chloroform-like odor.
BP: 296°F	MW: 167.9	LEL: NA	LEL: NA NFPA Fire Rating: NA
FRZ/MLT: FRZ: -33°F	VP: 5 mmHg	UEL: NA	UEL: NA NFPA Health Rating: NA
FP: NA	VD: NA		NFPA Reactivity Rating: NA
Sp. GR: (770F): 1.59	IP: 11.10 eV		NFPA Sp. Inst.: NA

Exposure Limits		
ОЅНА	NIOSH	Related Information
PEL-TWA ppm: 5	REL-TWA ppm: 1	AIHA Emergency Response Planning
PEL-TWA mg/m3: 35	REL-TWA mg/m3: 7	Guidelines - ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	C
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: IARC-3, NIOSH-
Skin Notation: Yes	Skin Notation: Yes	Ca, TLV-A3
Notes: NA	Notes: CARCINOGEN (Ca)	
	IDLH ppm: 100	

	IDLH mg/m3: NA		
	IDLH Notes: Ca		
NIOSH Pocket Guide	to Chemical Hazards	(Current through June	2006)
1,1,2,2-Tetrachloroe	oethane		CAS: 79-34-5
Formula: CHCI2CHCI2			RTECS: KI8575000
Synonyms & Trade Names: A	: Acetylene tetrachloride, Symm	Symmetrical tetrachloroethane	DOT ID & Guide: 1702 151
Exposure Limits			
NIOSH REL: Ca TWA 1 ppm (7 mg/m3) [skir Appendix A See Appendix C (Chloroethanes)	(7 mg/m3) [skin] See (Chloroethanes)	OSHA PEL : TWA 5 ppm (35 mg/m3) [skin]	ıg/m3) [skin]
IDLH: Ca [100 ppm]		Conversion: 1 ppm = 6.87 mg/m	/m3
Physical Description			
Colorless to pale-yellow liquid	Colorless to pale-yellow liquid with a pungent, chloroform-like odor.	like odor.	
MW: 167.9	BP: 296F	FRZ: -33F	Sol: 0.3%
VP: 5 mmHg	IP: 11.10 eV	RGasD: NA	Sp.Gr(77F): 1.59
FI.P: NA	UEL: NA	LEL: NA	MEC: NA
Noncombustible Liquid (See flammable and	flammable and combustible liquid classes)	quid classes)	
Incompatibilities & Reactivities	vities		
Chemically-active metals, str	ong caustics, fuming sulfuric	strong caustics, fuming sulfuric acid [Note: Degrades slowly when exposed to air.]	en exposed to air.]
Measurement Methods			
NIOSH 1019, 2562; OSHA 7			
Personal Protection & Sanitation	itation	First Aid	
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R.	tam rench	Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed (See procedures)	med
NIOSH Respirator Recomn	nmendations		
NIOSH: SCBAF:PD,PP/SAF:P (See symbols and codes)	NIOSH:SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE (See symbols and codes)	SCBAE	
Exposure Routes			

Symptoms
Nau, vomit, abdom pain; tremor fingers; jaun, hepatitis, liver tend; derm; monocy; kidney damage; [carc] (See abbreviations)
Target Organs
Skin, liver, kidneys, CNS, GI tract (See abb <u>reviations</u>)
DOT Emergency Response Guidebook (ERG 2004)
Guide Number: 151
151 Substances - Toxic (Non-Combustible) POTENTIAL HAZARDS
* Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin.
 * Fire may produce irritating, corrosive and/or toxic gases. * Runoff from fire control or dilution water may be corrosive and/or
toxic and cause pollution.
* Non-combustible, substance itself does not burn but may decompose upon
_
* Containers may explode when heated. * Runoff may pollute waterways.
UBL
* CALL Emergency Response Telephone Number on Shipping Paper first. If
Shipping Paper not avallable of no answer, refer to appropriate telephone number listed on the inside back cover.
* Isolate spill or leak area immediately for at least 25 to 50 meters
_
* Stay unwind.
* Keep of on areas.
* Wear positive pressure self-contained breathing apparatus (SCBA).
 Wear chemical protective clothing which is specifically recommended by the manufacturer. It may provide little or no thermal protection.
* Structural firefighters' protective clothing provides limited

protection in fire situations ONLY; it is not effective in spill

EVACUATION Spill

highlighted substances. For non-highlighted substances, increase, in See the Table of Initial Isolation and Protective Action Distances for the downwind direction, as necessary, the isolation distance shown under PUBLIC SAFETY.

Fire

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Small Fires

Dry chemical, CO2 or water spray.

Large Fires

Water spray, fog or regular foam.

Move containers from fire area if you can do it without risk,

Dike fire control water for later disposal; do not scatter the

Use water spray or fog; do not use straight streams.

Fire involving Tanks or Car/Trailer Loads

Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

Do not get water inside containers.

Cool containers with flooding quantities of water until well after

Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank,

ALWAYS stay away from tanks engulfed in fire.

For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

Do not touch damaged containers or spilled material unless wearing

appropriate protective clothing.

Stop leak if you can do it without risk.

Prevent entry into waterways, sewers, basements or confined areas.

Cover with plastic sheet to prevent spreading.

Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

DO NOT GET WATER INSIDE CONTAINERS.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
 - For minor skin contact, avoid spreading material on unaffected skin.
 - Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. (AAR, 1999)

with difficulty.) Use water in flooding quantities as fog. Use foam, dry chemical, or carbon dioxide. Apply water from as Firefighting: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns far a distance as possible. Keep run-off water out of sewers and water sources. (AAR, 1999)

Reactivity: Chemically-active metals, strong caustics, fuming sulfuric acid

First Aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, to protect themselves. (DOT, 1996)



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OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: CHLORODIPHENYL (54% CHLORINE)

CAS #: 11097-69-1 UN No: 2315 Synonyms: Aroclor®1254; PCB; Polychlorinated biphenyl

Formula: C6H3Cl2C6H2Cl3 (approx)

Physical Properties	S		
Physical Description:	Colorless to pale-yellow,	viscous liqu	Physical Description: Colorless to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor.
BP: 689-734ºF	MW: 326 (approx) LEL: NA	ĺ	NFPA Fire Rating: 1
FRZ/MLT: FRZ: 50°F	VP: 0.00006 mmHg	UEL: NA	VP: 0.00006 mmHg UEL: NA NFPA Health Rating: 2
FP: NA	VD: NA		NFPA Reactivity Rating: 0
Sp. GR: (77ºF): 1.38	IP: NA		NFPA Sp. Inst.: NA

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: NA	REL-TWA ppm: NA	AIHA Emergency Response Planning
PEL-TWA mg/m3: 0.5	REL-TWA mg/m3: 0.001	Guidelines - ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: IARC-2A,
Skin Notation: Yes	Skin Notation: No	NIOSH-Ca, NTP-R, TLV-A3
Notes: NA	Notes: CARCINOGEN (Ca), REL ALSO APPLIES TO OTHER PCBs	
		_

Parameter		
IDLH ppm: NA	IDLH mg/m3: 5	IDLH Notes: Ca

!	IDLH mg/m3: 5		
	IDLH Notes: Ca		
NIOSH Pocket Guide to Chemical	to Chemical Hazards	Hazards (Current through June	2006)
Chlorodiphenyl (54% chlorine)	chlorine)		CAS: 11097-69-1
Formula: C6H3Cl2C6H2Cl3 (a)	3 (approx)		RTECS: TQ1360000
Synonyms & Trade Names: Aroclor 1254, PCB, Polychlorinated biphenyl	roclor 1254, PCB, Polychlorin	ated biphenyl	DOT ID & Guide: 2315 171
Exposure Limits			
NIOSH REL*: Ca TWA 0.001 mg/m3 See Appendix A [*Note: The REL also applies to other PCBs.]	ng/m3 See Appendix A to other PCBs.]	OSHA PEL: TWA 0.5 mg/m3 [skin]	skin]
IDLH: Ca [5 mg/m3]		Conversion: NA	
Physical Description			
Colorless to pale-yellow, visco	us liquid or solid (below 50F	Colorless to pale-yellow, viscous liquid or solid (below 50F) with a mild, hydrocarbon odor.	ار.
MW: 326 (approx)	BP: 689-734F	FRZ: 50F	Sol: Insoluble
VP: 0.00006 mmHg	IP: ?	RGasD: NA	Sp.Gr(77F): 1.38
FI.P: NA	UEL: NA	LEL: NA	MEC: NA
Nonflammable Liquid, but exp dibenzofurans, and chlorinate	osure in a fire results in the d dibenzo-p-dioxins. (See fla	Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzo-p-dioxins. (See flammable and combustible liquid classes)	aining PCBs, polychlorinated 1 classes)
Incompatibilities & Reactivities	rities		
Strong oxidizers			
Measurement Methods			
NIOSH 5503; OSHA PV2088			
Personal Protection & Sani	Sanitation	First Aid	
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam		Eye: Irr immed Skin: Soap wash immed Breath: Resp support	
Remove: When wet or contam Change: Daily Provide: Eyewash, Quick drench	r Ich	Swallow: Medical attention immed (See procedures)	ımed
	mmendations		
NIOSH: SCBAF:PD,PP/SAF:PI (See symbols and codes)	AF:PD,PP:ASCBA Escape: GMFOVHIE/SCBAE	HE/SCBAE	

Symptoms Irrit eyes, chloracne; liver damage; repro effects; [carc] (See abbreviations) Target Organs Skin, eyes, liver, repro sys (See abhreviations)	Exposure Routes
Symptoms Irrit eyes, chloracne; liver damage; repro effects; [carc] (See abbreviations) Target Organs Skin, eyes, liver, repro sys (See abbreviations)	Inh Abs Ing Con
Irrit eyes, chloracne; liver damage; repro effects; [carc] (See abbreviations) Target Organs Skin, eyes, liver, repro sys (See abbreviations)	Symptoms
Target Organs Skin, eyes, liver, repro sys (See abbreviations)	Irrit eyes, chloracne; liver damage; repro effects; [carc] (See abbreviations)
Skin, eyes, liver, repro sys (See aphreviations)	Target Organs
	Skin, eyes, liver, repro sys (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 171

171 Substances (Low to Moderate Hazard)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- Some may burn but none ignite readily.
- Those substances designated with a P may polymerize explosively when
 - heated or involved in a fire.
- Containers may explode when heated.
 - Some may be transported hot.

- Inhalation of material may be harmful.
- Contact may cause burns to skin and eyes.
- Inhalation of Asbestos dust may have a damaging effect on the lungs.
 - Fire may produce irritating, corrosive and/or toxic gases.
 - Runoff from fire control may cause pollution.

PUBLIC SAFETY

- CALL Emergency Response Telephone Number on Shipping Paper first. If
 - Shipping Paper not available or no answer, refer to appropriate
 - Isolate spill or leak area immediately for at least 10 to 25 meters telephone number listed on the inside back cover.
 - '30 to 80 feet) in all directions.
 - Keep unauthorized personnel away.

Stay upwind.

- PROTECTIVE CLOTHING
- Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited

EVACUATION

Fire

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

Small Fires

Dry chemical, CO2, water spray or regular foam.

Large Fires

Water spray, fog or regular foam.

Move containers from fire area if you can do it without risk.

Do not scatter spilled material with high pressure water streams.

Dike fire-control water for later disposal.

Fire involving Tanks

Cool containers with flooding quantities of water until well after

fire is out. Withdraw immediately in case of rising sound from venting safety

devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

Do not touch or walk through spilled material.

Stop leak if you can do it without risk.

Prevent dust cloud.

Avoid inhalation of asbestos dust.

oll Dry Chille

With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

Small Spills

Take up with sand or other noncombustible absorbent material and place into containers for later disposal.

Large Spills

Dike far ahead of liquid spill for later disposal.

Cover powder spill with plastic sheet or tarp to minimize spreading.

Prevent entry into waterways, sewers, basements or confined areas.

FIRST AID

Move victim to fresh air.

Call 911 or emergency medical service.

Apply artificial respiration if victim is not breathing.

Administer oxygen if breathing is difficult.

Remove and isolate contaminated clothing and shoes.

In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.

Ensure that medical personnel are aware of the material(s) involved,

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and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Attempt to stop leak if without undue personnel hazard. Apply water spray or mist to knock down vapors. Land spill: Dig polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Water spill: Use natural barriers or oil spill control booms to limit spill travel. Remove trapped material with suction hoses. (AAR, Non-fire Spill Response: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed 1999)

Firefighting: Use foam, dry chemical, or carbon dioxide. Keep run-off water out of sewers and water sources. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. (AAR, 1999)

Reactivity: This compound is incompatible with the following:Strong oxidizers (NIOSH, 1997)

First Aid: Eye: If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally water. If this chemical penetrates the clothing immediately remove the clothing and wash the skin with soap and water. warm and at rest. Get medical attention as soon as possible. Swallow: If this chemical has been swallowed, get medical person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person ifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working Get medical attention promptly. Breathing: If a person breathes large amounts of this chemical, move the exposed with this chemical. Skin: If this chemical contacts the skin, immediately wash the contaminated skin with soap and attention immediately. (NIOSH, 1997)

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OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: HEXACHLOROBENZENE

CAS #: 118-74-1

Synonyms:

UN No: 2729

Formula: C6Cl6

Physical Properties	Se		
Physical Description:			
BP: NA	MW: 284.78	LEL: NA	LEL: NA NFPA Fire Rating: 1
FRZ/MLT: FRZ: NA	VP: NA	UEL: NA	UEL: NA NFPA Health Rating: 1
FP: NA	VD: NA		NFPA Reactivity Rating: 0
Sp. GR: NA	IP: NA		NFPA Sp. Inst.: NA

Exposure Limits		
ОЅНА	NIOSH	Related Information
PEL-TWA ppm: NA	REL-TWA ppm: NA	AIHA Emergency Response Planning
PEL-TWA mg/m3: NA	REL-TWA mg/m3: NA	Guidelines - ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: IARC-2B, NTP-R,
Skin Notation: No	Skin Notation: No	TLV-A3
Notes: NA	Notes: NA	
	IDLH ppm: NA	

IDLH mg/m3: NA	
IDLH Notes: NA	

NA	o cilcilical Hazalus	ne to chemical nazarus (current un ough June	2000)
			CAS: NA
Formula: NA			RTECS: NA
Synonyms & Trade Names: NA	৮		DOT ID & Guide: NA
Exposure Limits			
NIOSH REL: NA		OSHA PEL: NA	
IDLH: NIOSH IDLH: NA		Conversion: NA	
Physical Description			
Description: NA			
MW: NA	BP: NA	FRZ: NA	Sol: NA
VP: NA	IP: NA	RGasD: NA	SG: NA
FP: NA	UEL: NA	LEL: NA	MEC: NA
NA (See flammable and combu	combustible liquid classes)		
Incompatibilities & Reactivities	ities		
NA			
Measurement Methods			
NA			
Personal Protection & Sanit	Sanitation	First Aid	
NA		NA (See procedures)	
NIOSH Respirator Recommendations	endations		
NA (see symbols and codes)			
Exposure Routes			
NA AN			
Symptoms			
NA (See_abbreviations)			

Contact with molten substance may cause severe burns to skin and eyes. CALL Emergency Response Telephone Number on Shipping Paper first. If Wear chemical protective clothing which is specifically recommended by Highly toxic, may be fatal if inhaled, swallowed or absorbed through Wear positive pressure self-contained breathing apparatus (SCBA) Runoff from fire control or dilution water may be corrosive and/or Isolate spill or leak area immediately for at least 25 to 50 meters the manufacturer. It may provide little or no thermal protection. Shipping Paper not available or no answer, refer to appropriate DOT Emergency Response Guidebook (ERG 2004) Combustible material: may burn but does not ignite readily. Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill Fire may produce irritating, corrosive and/or toxic gases. telephone number listed on the inside back cover. Substance may be transported in a molten form. Effects of contact or inhalation may be delayed. Containers may explode when heated. 152 Substances - Toxic (Combustible) Keep unauthorized personnel away. (80 to 160 feet) in all directions. Runoff may pollute waterways. toxic and cause pollution. Avoid any skin contact. Keep out of low areas. PROTECTIVE CLOTHING POTENTIAL HAZARDS FIRE OR EXPLOSION **Guide Number: 152** (See abbreviations) Stay upwind. **PUBLIC SAFETY Target Organs** situations. **EVACUATION** Spill HEALTH skin,

file://P:\D\Detrex\13811443\DOCs\Plans\HASP\HASP revised MAY 2008\Appendices\Appendix A\MSDS\OSHA-EPA Occupa... 6/6/2008

highlighted substances. For non-highlighted substances, increase, in See the Table of Initial Isolation and Protective Action Distances for the downwind direction, as necessary, the isolation distance shown under PUBLIC SAFETY.

Fire

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Small Fires

Dry chemical, CO2 or water spray.

Large Fires

- Water spray, fog or regular foam.
- Move containers from fire area if you can do it without risk,
- Dike fire control water for later disposal; do not scatter the
- Use water spray or fog; do not use straight streams.

involving Tanks or Car/Trailer Loads Fire

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Do not get water inside containers,
- Cool containers with flooding quantities of water until well after fire is out.
- devices or discoloration of tank.
- Withdraw immediately in case of rising sound from venting safety
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- Do not touch damaged containers or spilled material unless wearing
 - appropriate protective clothing.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
 - Cover with plastic sheet to prevent spreading.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
 - DO NOT GET WATER INSIDE CONTAINERS.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Do not use mouth-to-mouth method if victim ingested or inhaled the

substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical

- Administer oxygen if breathing is difficult,
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
 - For minor skin contact, avoid spreading material on unaffected skin.
 - Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. (AAR,

with difficulty.) Use water in flooding quantities as fog. Use foam, dry chemical, or carbon dioxide. Keep run-off water Firefighting: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns out of sewers and water sources. (AAR, 1999)

Reactivity: STABILITY: This chemical is sensitive to moisture. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions.REACTIVITY: This chemical reacts violently with dimethylformamide. (NTP, 1992)

throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING, IMMEDIATELY transport the victim to victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. If the victim is poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the victim is

ruge 6 of v

a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity regarding the possible long term health effects and potential recommendation for medical monitoring. properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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Occupational Safety & Health Administration 200 Constitution Avenue, NW Washington, DC 20210

Safety data for 1,1,2-trichloroethane



Glossary of terms on this data sheet.

The information on this web page is provided to help you to work safely, but it is intended to be an overview of hazards, not a replacement for a full Material Safety Data Sheet (MSDS). MSDS forms can be downloaded from the web sites of many chemical suppliers.

Molecular formula: C₂H₃Cl₃ Synonyms: vinyl trichloride

CAS No: 79-00-5 EC No: 201-166-9

Physical data

Appearance: colourless liquid with a mild chloroform odour

Melting point: -35 C

Boiling point: 114 C

Vapour density: 4.6

Vapour pressure: 19 mm Hg at 20 C

Specific gravity: 1.435

Flash point: none Explosion limits: 8.4 - 13.3% Autoignition temperature:

Stability

Stable.

Toxicology

Harmful by inhalation, ingestion and skin contact. Respiratory and eye irritant. Laboratory evidence suggests that low molecular weight chlorinated hydrocarbons may be carcinogenic. Treat this chemical as a possible carcinogen. Typical TLV 10 ppm. Typical PEL 10 ppm.

Toxicity data

(The meaning of any abbreviations which appear in this section is given here.) SKN-RBT LD50 3730 mg kg⁻¹ SCN-MUS LD50 227 mg kg⁻¹ ORL-RAT LD50 580 mg kg⁻¹ IPR-MUS LD50 494 mg kg⁻¹

Risk phrases

(The meaning of any risk phrases which appear in this section is given <u>here.)</u> R20 R21 R22 R36 R37 R45.

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.) UN No 2810. Hazard class 6.1. Packing group III.

Personal protection

Safety glasses, gloves, good ventilation.

Safety phrases

(The meaning of any safety phrases which appear in this section is given here.) S9 S36 S37 S46.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

This information was last updated on June 21, 2006. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

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OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: 1,1,1,2-TETRACHLOROETHANE

CAS #: 630-20-6

Synonyms:

UN No: 1702

Formula: C2H2Cl4

Physical Properties Physical Description: Ye BP: 2670F FRZ/MLT: FRZ: -940F VF	irties ion: Yellowish-red liquid. MW: 167.9 40F VP: (770F): 14 mmHg	LEL: NA UEL: NA	Physical Properties Physical Description: Yellowish-red liquid. BP: 2670F MW: 167.9 FRZ/MLT: FRZ: -940F VP: (770F): 14 mmHg UEL: NA NFPA Health Rating: NA
FP: NA	VD: NA		NFPA Reactivity Rating: NA
Sp. GR: 1.54	IP: NA		NFPA Sp. Inst.: NA

Exposure Limits		
ОЅНА	NIOSH	Related Information
PEL-TWA ppm: NA	REL-TWA ppm: NA	AIHA Emergency Response Planning
PEL-TWA mg/m3: NA	REL-TWA mg/m3: NA	Guidelines - ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: IARC-3
Skin Notation: No	Skin Notation: No	
Notes: NA	Notes: HANDLE WITH CAUTION	
	IDLH ppm: NA	

IDIH Notes: NA		IDLH mg/m3: NA		
to Chemical Hazards (Current through June 2006) ethane Ratecs: K18450000 None Lition in the workplace. See OSHA PEL: none Conversion: NA BP: 267F BP: 267F Conversion: NA LEI: ? Conversion: NA LEI: ? LEI: ? ReasD: NA Sp.Gr: 1.54 UEI: ? LEI: ? ReasD: NA Sp.Gr: 1.54 LEI: ? LEI: ? ReasD: NA Sp.Gr: 1.54 LEI: ? Initation First Aid Eye: Irr immed Skin: Soap wash immed		IDLH Notes: NA		
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TBAL (See symbols and codes) Exposure Routes	NIOSH Respirator Recomi	mendations		
Exposure Routes	TBAL (See symbols and codes)		1	
	Exposure Routes			

protection in fire situations ONLY; it is not effective in spill situations.

EVACUATION

highlighted substances. For non-highlighted substances, increase, in See the Table of Initial Isolation and Protective Action Distances for the downwind direction, as necessary, the isolation distance shown under PUBLIC SAFETY.

Fire

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Small Fires

Dry chemical, CO2 or water spray.

Large Fires

- Water spray, fog or regular foam.
- Move containers from fire area if you can do it without risk.
- Dike fire control water for later disposal; do not scatter the material.
- Use water spray or fog; do not use straight streams.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or
 - monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Do not get water inside containers.
- Withdraw immediately in case of rising sound from venting safety
 - ALWAYS stay away from tanks engulfed in fire. devices or discoloration of tank.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- Do not touch damaged containers or spilled material unless wearing
 - appropriate protective clothing.
- Stop leak if you can do it without risk,
- Prevent entry into waterways, sewers, basements or confined areas.
 - Cover with plastic sheet to prevent spreading.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
 - DO NOT GET WATER INSIDE CONTAINERS.

FIRST AID

- * Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
 - * Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to
- substance may be delayed.

 Ensure that medical personnel are aware of the material(s) involved,

and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

PRECAUTIONS: You should protect this chemical from exposure to light. Keep the container tightly closed under an inert paper should be sealed in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with Non-fire Spill Response: SMALL SPILLS AND LEAKAGE: If you spill this chemical, FIRST REMOVE ALL SOURCES OF 60-70% ethanol followed by washing with a soap and water solution. Do not reenter the contaminated area until the GNITION. Then, use absorbent paper to pick up all liquid spill material. Your contaminated clothing and absorbent Safety Officer (or other responsible person) has verified that the area has been properly cleaned.STORAGE atmosphere, and store under refrigerated temperatures. (NTP, 1992)

Firefighting: Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher. A water spray may also be used. (NTP, 1992)

may react with chemically active metals, strong caustics, hot iron, aluminum and zinc in presence of steam. It may also Reactivity: STABILITY: This compound is sensitive to air, moisture and light. Solutions of this chemical in anhydrous dinitrophenyl disulfide, potassium, potassium hydroxide, nitrogen tetraoxide, sodium and sodium potassium alloy. It DMSO, ethanol or acetone should be stable for 24 hours under normal lab conditions. REACTIVITY: This chemical is incompatible with strong oxidizing agents and strong bases. It is also incompatible with dinitrogen tetraoxide, 2,4react with mixtures of dinitrogen tetraoxide with halocarbons. (NTP, 1992)

transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or

Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's should contact a physician for advice regarding the possible long term health effects and potential recommendation for washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Corrosive chemicals will destroy the membranes of the symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after Fransport the victim IMMEDIATELY to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. mouth, throat, and esophagus and, in addition, have a high risk of being aspirated into the victim's lungs during medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, wheezing, coughing, shortness of breathing, or burning in the mouth, throat, or chest) develop. Provide proper physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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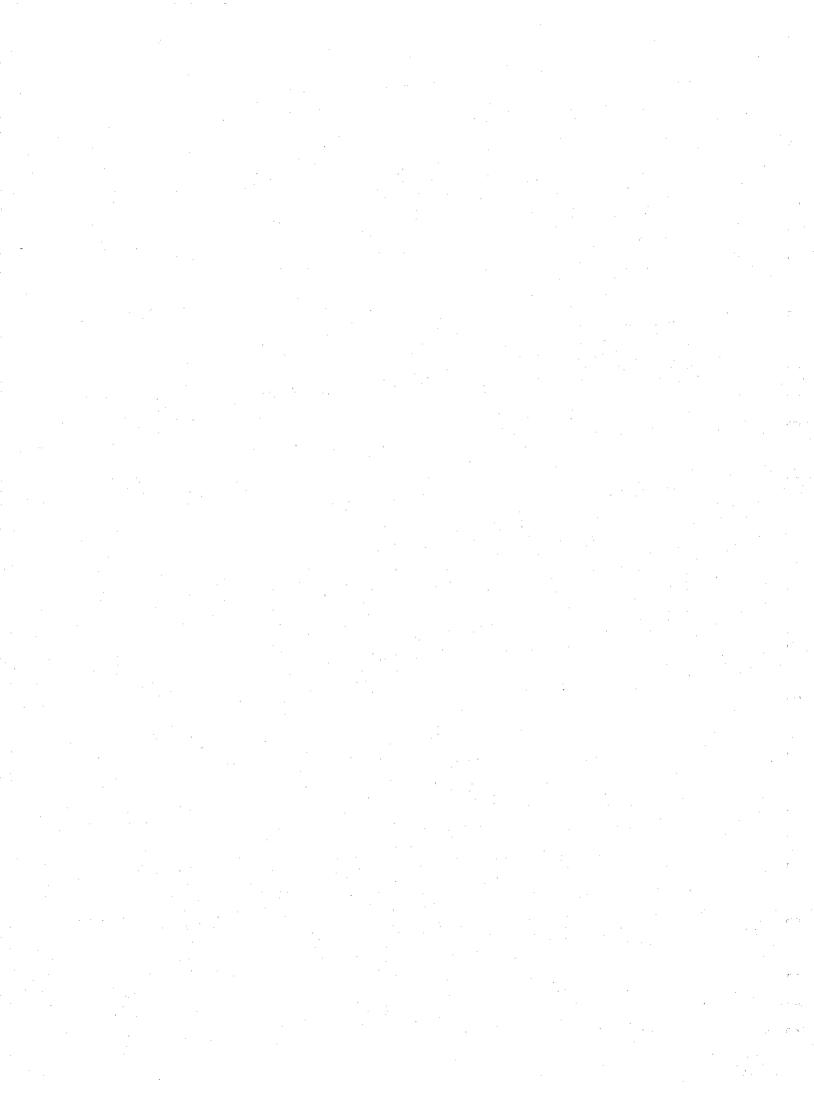
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Occupational Safety & Health Administration 200 Constitution Avenue, NW Washington, DC 20210

APPENDIX B

Standard Operating Procedures and Safety Management Standards



URS SAFETY MANAGEMENT STANDARD Worker Right-to-Know (Hazard Communication)

1. Applicability

This program applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The worker right-to-know program provides URS personnel with information and training about safety and health hazards associated with the chemicals they might encounter in the workplace. This procedure describes how chemical safety hazards are communicated to URS personnel and how information is to be provided to employees of other employers working at the location. The requirements include steps to acquire this information, maintain it, and train personnel in the hazard communication program.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure.

4. Requirements

A. Hazardous Material Inventory:

Maintain a hazardous material inventory that lists all of the hazardous materials used at each workplace (i.e., office/field location). Use chemical names consistent with the applicable material safety data sheet (MSDS).

B. Material Safety Data Sheets (MSDS)

- 1. Obtain a MSDS for each chemical before it is used.
- Review each MSDS when it is received to evaluate whether the information is complete and to determine if existing protective measures are adequate.
- 3. Maintain a collection of all applicable and relevant MSDS where they are accessible by all employees at all times.
- 4. Replace MSDS when updated sheets are received. Communicate any significant changes to those who work with the chemical.

Issue Date: June 1999 Revision 4: June 2007

URS SAFETY MANAGEMENT STANDARD Worker Right-to-Know (Hazard Communication)

5. MSDS are required for all hazardous materials used on site by project personnel.

C. Labels

Unless each container has appropriate labeling, label all chemical containers with:

- 1. Identity of the hazardous chemical(s),
- 2. Appropriate hazard warnings, and
- 3. Name and address of the chemical manufacturer, importer, or other responsible party.
- 4. Labels on incoming containers of hazardous materials will not be removed or defaced.

D. Hazardous Nonroutine Tasks

Periodically, employees are required to perform hazardous non-routine tasks. Prior to starting work on such projects, provide each employee with information about hazards to which they may be exposed during such an activity.

This information will include:

- 1. Specific chemical hazards.
- 2. Protective/safety measures which must be utilized; and
- 3. Measures that have been taken to lessen the hazards including ventilation, respirators, presence of another employee and emergency procedures.

E. Informing Contractors/Subcontractors

Provide contractors/subcontractors the following information on chemicals used by or provided to URS personnel:

- 1. Names of hazardous chemicals to which they may be exposed while on the jobsite.
- 2. Precautions the employees may take to lessen the possibility of exposure by usage of appropriate protective measures.

URS SAFETY MANAGEMENT STANDARD Worker Right-to-Know (Hazard Communication)

3. Location of MSDS.

F. Training

- 1. Conduct training of all employees potentially exposed to hazardous materials on the following schedule:
 - a. Before new employees begin their jobs.
 - b. Whenever new chemicals are introduced into the workplace, or
 - c. Annually thereafter.
- 2. This training will include:
 - a. Applicable regulatory requirements.
 - b. Names of those responsible for implementing this program.
 - c. Location of the program, inventory and MSDS.
 - d. Chemicals used and their hazards (chemical, physical and health).
 - e. How to detect the presence or release of chemicals.
 - f. Safe work practices.
 - g. How to read an MSDS.
- 3. Document the training.
- 4. Where non-English speaking workers are employed, provisions for training in the appropriate language shall be arranged.

5. Documentation Summary

- A. File these records:
 - 1. Chemical Inventory.
 - 2. Location of the MSDS inventory.
 - 3. Training records.

URS SAFETY MANAGEMENT STANDARD Worker Right-to-Know (Hazard Communication)

4. Contractor/Subcontractor notifications.

6. Resources

- A. U.S. OSHA Technical Links Hazard Communication
- B. U.K. Control of Substance Hazardous to Health Regulations

References to the UK legislation listed above can be found at the link provided:

www.tionestop.com

username: Thorburn password: Dames

enter search criteria - (see underlined text)

select the checkbox for Construction Information Service (CIS)

- C. National Paint and Coatings Association (NPCA) <u>Hazardous Materials</u> <u>Identification System (HMIS) Version III</u>
- National Fire Protection Association (NFPA) Standard 704 (Standard System for the Identification of Hazardous Materials for Emergency Response)

URS SAFETY MANAGEMENT STANDARD Accessing Industrial Sites

1. Applicability

This procedure applies to projects where URS personnel access industrial sites.

2. Purpose and Scope

The purpose of this procedure is to ensure that personnel use the appropriate personal protective equipment, and they receive appropriate hazard, safety and emergency information when accessing industrial sites.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

- A. Prior to accessing the site contact the facility to determine:
 - 1. PPE requirements for personnel SMS 29.
 - 2. The procedure for safely accessing the site.
 - The need for training and/or orientation upon arrival including MSDS.
 - 4. Any other safety procedures specifically required at the site that would require advance planning or coordination.
 - 5. Security requirements.
- B. Develop a Health and Safety Plan or a Safe Work Plan, as required by site requirements.
- C. Upon accessing the site:
 - 1. Report to the designated entry location.
 - 2. Attend required safety orientation/briefings.
 - 3. Prepare to comply with site rules.
 - 4. Inquire as to the following issues if not addressed:

SMS 004 Issue Date: June 1999 Revision 2: March 2005

URS SAFETY MANAGEMENT STANDARD Accessing Industrial Sites

- a. Facility emergency procedures including alarms and evacuation procedures.
- b. How to activate emergency procedures if necessary.
- c. Information regarding potential chemical exposures:
 - 1. MSDS access SMS 002.
 - 2. Where these potential exposures exist.
 - 3. Controls in place to prevent exposures.
 - 4. How to identify when exposures may occur.
- d. Safety hazards which may not be inherently obvious and site rules or procedures regarding those hazards.
- e. Traffic issues within the facility including:
 - 1. Lift truck and material handling vehicles.
 - 2. Establishment of Right of Way.
 - 3. Vehicle access to site, including speed limits.
 - 4. Special pedestrian rules.
- f. Major program coordination issues, such as:
 - 1. Confined Space Entry Procedures SMS 10.
 - Lockout/Tagout and Control of Hazardous Energy Procedures – <u>SMS 023</u>.
 - 3. Utility clearances SMS 034.
 - 4. Hot Work Permits SMS 020.
- D. Document site issues on Attachment 4-1.
- E. Enter the site prepared to comply with URS and site procedures. In the event that there is a discrepancy, coordinate with site representative and prepare to use the most protective procedure.

URS SAFETY MANAGEMENT STANDARD Accessing Industrial Sites

F. Wherever significant safety issues remain that cannot be resolved locally, contact the local URS Health, Safety, and Environment Representative for support in resolving such issues.

5. Documentation Summary

A. File <u>Attachment 4-1</u> "Accessing Industrial Sites" in the Project Health and Safety File.

6. Resources

A. Attachment 4-1 - Assessment Form



Health, Safety, and Environment HEALTH AND SAFETY ASSESSMENT

Attachment 4-1

Revision 1: March 2005

Industrial Site					
Project Manager	ate				
		Yes	. ગ જ	No	N/A
PRE-JOB SURVEY	1. 199 Sjary	1	a a 1877, 8		
Are there PPE requirements for site access?					
If yes, describe the requirements.					
What are the procedures for safely accessing the site?					
Is there a requirement for orientation or a safety briefing upon arrival?	- 				
Are there any other safety or security procedures specific to this site that require advance planning?					
If yes, describe the requirements					
UPON ACCESSING THE SITE				- 12 · · ·	
Have facility emergency procedures been discussed?			-		
Alarms					
Evacuation Routes			\perp		
Procedures to activate emergency system					
Has the worker Right to Know program for the site been addressed (Hazcom/WHMIS)?				····	
Site chemical hazards shared with URS staff?					
Information provided to owner regarding chemicals brought to site URS?	by				
Are all parties aware of how to detect exposures to chemicals?					
Have control measures regarding potential chemical exposures be discussed between parties?	en				

Are there any safety hazards on the site which are not inherently obvious?



Health, Safety, and Environment HEALTH AND SAFETY ASSESSMENT

Attachment 4-1

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		Yes	No	N/A
If yes, describe hazards and site protective measures.				
		1		
Are there any special traffic rules for the site?				
Lift truck or material handling vehicles onsite?				
Right of way issues? Speed limits?				
If yes, describe.				
Are there any special rules for contractor vehicles on site?				
Are there any special pedestrian rules?				
If yes, describe				
Are there any major program coordination issues at this site?				
Confined Space Entry				
Lockout/Tagout			******	
Utility Clearances / Hot Work Permits				
If yes, describe.		-	<u> </u>	
]		
Have all of the above-related issues been shared with all project-related	ted			
personnel and subcontractors?				
If no, why not?		Ì		
		<u> </u>		
Project Manager	Date _			
Site Manager	Date			

1. Applicability

This program applies to the operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

This procedure is intended to protect personnel from the hazards associated with confined space entry.

A confined space is:

- 1. Large enough for personnel entry,
- 2. Has limited or restricted means for entry or exit, and
- 3. Is not designed for continuous occupancy.

A Non-Permit space is a confined space that does not present any potential hazards, nor will the work performed therein create a hazardous condition.

A Permit-Required space is a confined space that may present one or more potential hazards including hazardous atmospheres, fire/explosion, engulfment, entrapment, electrical, mechanical, or any other serious hazard. (Note: For Australian operations, all confined space entries require a permit.)

Permit required confined space hazards include risks of asphyxiation, fire or explosion, chemical exposure, engulfment or drowning, electrocution, or dismemberment. Examples include, but are not limited to, sewers, utility vaults, tanks, sump pits, and excavations where there is the potential for atmospheric hazards.

This procedure applies to all permit required confined space entry activities performed by URS or any contractor and/or subcontractor.

Entry into either a non-permit or permit confined space occurs whenever any body part crosses the plane of entry of the space.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure.

4. Requirements

1. 1

A. Entry Supervisor:

- 1. Determines whether a space is a "permit required" or non permit space.
- 2. Is responsible for onsite verification of acceptable entry conditions prior to entry.
- 3. Is responsible for assigning appropriately trained personnel to the project.
- 4. Has knowledge of required confined space entry equipment.
- 5. Has the ability to recognize and test hazardous atmospheres.
- 6. Is capable of performing a thorough hazard evaluation of the space and of the work that will be performed therein.
- 7. Understands how to execute a Confined Space Permit as well as any other required permit, such as a Hot Work permit.
- 8. Has authority to stop work and take corrective actions when conditions change.
- 9. Has had formal, documented training as a confined space Entry Supervisor.

B. Permit System

- 1. Utilize the "Confined Space Entry Permit and Procedures" form, Attachment 10-1, for permit space entry evaluation and establishment of required entry parameters.
- 2. Require confined space entry permits to be issued at least each shift by the Entry Supervisor.

C. Planning for Confined Space Entry

1. The Entry Supervisor:

- a. Contacts the facility representative to gather information about the confined space and to determine if the facility has any entry requirements that must be followed.
- b. Performs a Hazard Evaluation using the Confined Space Permit and Procedures for Entry Form, <u>Attachment 10-1</u>.
- c. Determines whether the space is a "permit required confined space" or a non-permit required confined space.
- d. Assesses whether those hazards that create the "permit required confined space" can be eliminated without employee entry into the space. By eliminating hazards that are immediately dangerous to life or health, administrative and rescue requirements are lessened and risk to workers is reduced.
- e. Determines rescue requirements for the space if so designated as a "permit required confined space".
- f. Arranges for qualified Entrants and Attendants.
- g. Identifies all equipment, including personal protective equipment, needed for the job.
- h. Obtains all equipment and verifies that it is functional.
- i. Coordinates confined space entry activities with other contractors on site that may be affected by the entry and provide them with a copy of this written program.

D. Site Confined Space Preparation

- 1. Space Isolation
 - a. Verify the confined space is drained and cleaned.
 - b. Isolate the confined space as described on the Hazard Evaluation form or other applicable written procedures.
 - c. Isolate all forms of potential energy inside the confined space, including:
 - 1. Electrical

- 2. Mechanical
- 3. Thermal
- 4. Pneumatic
- 5. Hydraulic
- d. Isolate all lines carrying fuels, liquids or gases into the space.
- e. Develop alternate procedures for protection of entrants for lines which may not be controlled (e.g., lines through storm water or sewer vaults).
- f. Open the entry point to the confined space.
- g. Provide barricades and post the entrance of the space with a sign stating "Danger Confined Space Do Not Enter" or equivalent wording.

2. Electrical Equipment

- a. Provide electrical equipment that meets the electrical classification of the area. See <u>SMS 012</u>, "Electrical Safety".
- b. Route all portable electrical equipment through ground fault circuit interruption (GFCI) devices.

3. Atmospheric Tests

- Calibrate monitoring equipment before and after sampling and record information on the Daily Instrument Calibration Form.
- b. Make initial atmospheric tests of the space with ventilation OFF.
- Attach extension probes to the monitoring equipment, or lengths of silicone or similarly inert tubing material, to reach the bottom of the space. For horizontal spaces, the probe may need to be attached to a pole.
- d. Take atmospheric measurements in several locations (bottom, middle, top, corners) allowing extra response time

from the instrumentation to register, especially if a tubing extension is used.

Consult the monitoring equipment's operating manual to determine the additional response time required.

- e. Obtain reading for oxygen first, followed by %LEL, then for other contaminants of concern (if applicable).
- f. Record all results on the permit and sign and initial where indicated.
- g. Determine if acceptable entry conditions exist with respect to oxygen, %LEL, other hazardous atmospheres.
- h. If unacceptable entry conditions are indicated, correct the limiting condition.
- If acceptable entry conditions exist, determine times that the monitoring will be repeated or if continuous monitoring will be needed.
- j. Monitor continuously for oxygen and %LEL if hot work will be performed in the space.

4. Ventilation

- a. Open as many openings as possible in the space to aid in cross ventilation.
- b. Never ventilate confined spaces with oxygen.
- c. Provide five (5) air changes per hour, or at least 10,000 cfm for large spaces.
- d. If a generator is used to provide power, be sure that the exhaust does not enter the space. Carbon monoxide monitoring may be required.
- e. Place blower ductwork such that it does not create a hazard by impairing the line of vision of attendants to observe space entrants, or by blowing contaminants to other workers.

- f. Provide at least 2,000 cfm of active exhaust ventilation for each welder or torch operating under a Hot Work Permit within the space.
- g. Use fire/explosive proof ventilating equipment that is properly grounded when exhausting flammable gases, vapors and dusts from confined spaces.

5. Authorizing the Permit

- a. The Entry Supervisor personally inspects the work area and signs the permit after confirming that all necessary precautions have been taken and all relevant information concerning the entry parameters are documented on the permit.
- b. Conduct a briefing informing all entrants and attendants of space conditions.
- c. Require entrant(s) and attendant(s) to each print their names and sign the permit.
- d. Affix the permit to a location near the space entrance.

E. Entry Operations

- 1. Prohibit entry when oxygen deficient or flammable atmospheres are present in the space.
- 2. Limit entry to qualified entrants listed on the permit and only for the purpose stated on the permit.
- 3. Require entrants to follow all requirements listed on permit.
- 4. Attach body harness, if required, to a lifeline, and the other end of the life line is attached to a fixed point or to a mechanical lifting device outside the space at all times the entrant(s) are in the space.
- 5. Require that the attendant(s) remain at the entrance whenever an entrant is inside the confined space. The attendant may not be assigned other duties that may distract him/her from maintaining uninterrupted contact with the entrant(s). The attendant may only attend to one confined space entry at any one time. Each space must have its own attendant.

F. Exiting the Confined Space

- 1. Attendant will order entrant(s) out of space whenever:
 - a. A prohibited condition on the entry permit develops.
 - b. The surrounding work area becomes unsafe.
 - c. Any monitoring instrumentation, rescue equipment, ventilation, etc. becomes compromised.
 - d. Possible symptoms of exposure are noted in the entrant(s).
 - e. Entrant(s) express any type of concern regarding the safety of the entry.

G. Rescue

- Require non-entry rescue procedures to be used for every entry. Typically, non-entry rescue will require the use of a tripod and winch, lanyard, and full body harness.
- 2. When local emergency services are not available for rescue, contract for qualified entry rescue services. Entry rescue must be staged on site adjacent to the space for the duration of the entry.
- 3. URS will not place staff at risk by allowing confined space entry when qualified rescue teams cannot be identified.

H. When the Entry Work is Complete

Cancel the permit by obtaining the signature of the entry supervisor and recording the time and date on the permit. This should be accomplished after the space is resealed and signs and barricades removed. If the space cannot be closed until a later time, provisions must be maintained (barricades, warning signs) to discourage persons from entering the space.

Audits of the Confined Space Entry Program

Annual audits of this Safety Management Standard will be conducted in accordance with the procedures set forth in the URS <u>SMS 68</u> – Health and Safety Compliance Assurance.

The Project Manager will require compliance with this SMS by reviewing Entry Permits on a weekly basis and document this review by notation on the permits.

J. Training

Require Entry Supervisors, Entrants, and Attendants to be trained prior to initial assignment, prior to change in assigned duties, if a new hazard has been created or special deviations have occurred.

5. Documentation Summary

Records required in the Project Safety File

- A. Entry supervisor, Entrant and Attendant qualifications.
- B. Confined Space Entry Permits plus Hot Work Permits (if issued).
- C. Monitoring equipment calibration logs.
- D. Lock-out/Tag-out records (if used).
- E. Daily worker briefing documentation.

6. Resources

- A. U.S. OSHA Standard 29 CFR 1910.146 <u>Permit Required Confined Spaces</u>
- B. U.S. OSHA Technical Links Confined Spaces
- C. U.K. Factories Act
- D. Australian Standards AS 2865-1995 Safeworking in a Confined Space
- E. Worksafe Australia Working in Confined Spaces
- F. US Army Corp of Engineers EM 385-1-1, Section 06.1.
- G. Attachment 10-1 Confined Space Permit and Procedures for Entry

URS Corporation

CONFINED SPACE PERMIT & PROCEDURES FOR ENTRY

Confined Space Name: Confined Space Location:		No. Date:
Entry Authorized By:	Time Issued:	Time expires:

Reason(s) for 1	Entry	Hazards	
		·····	

ISOLATION

Equipment to Lock/Tag/Test (including blocking, blanking, and/or disconnecting electrical, hydraulic, pneumatic, kinetic, thermal, steam, chemical, springs):

Equipment Name:	Isolated by:	Location:	Done

ENTRY REQUIREMENTS:	Required	Checked		Required	Checked
Eye Protection			Hot Work Permit		
- Safety Glasses			Communications		
- Goggles			Air Mover(s)		
- Face Shield			Rescue Hoist and Other Related Equipment		
Hearing Protection			Rescue Lanyard		
Fall Protection			GFCI Protected Electrical		·
Respiratory Protection			Explosion Proof Lighting/Electrical		
- 1/2 Face Disposable			Non-sparking Tools		
- 1/2 Face Cartridge			Ladders		
- Full Face			Blocking/Blanking Equipment		
- Powered Air Purifying			Air Monitoring		
- Supplied Air			- Oxygen		
Gloves Type			- Combustibles		
Boots Type			- Carbon monoxide		
Clothing Type			- Hydrogen sulfide		
Hard Hat		· ·	- Dust		
Other			- Other		

Comments:

	Pre-Entry	Continuous	ous	Record readings ev	Record readings every 30 minutes (minimum)			
Atmospheric Testing	Needed	Time: Results/Initials	Needed	Time: Results/Initials	Time: Results/Initials	Time: Results/Initials	Time: Results/Initials	Time: Results/Initials
Oxygen (19.5-23.5%)								
Combustibles(<10%LEL)								
Carbon Monoxide (<35 ppm)								
Hydrogen Sulfide (<2 ppm)								
Dust (visibility > 10')								
Other								
Other								
Note: Sign the permit and authorize entry only when the atmospheric conditions meet the permissible entry levels shown for a minimum period of 30 minutes prior to entry	only when the	atmospheric conditions i	meet the perm	issible entry levels showr	for a minimum period of	30 minutes prior to entry		
Name of Tester:					Signature:			
Testing Equipment Used		Type		Model			I.D. Number	
Emergency Action Plan:					•			
Authorization				Signature	ure			Time/Date
Entry Supervisor: (print) I certify that the requirements of this confined space entry pennit have been the confined space to which this permit applies.	ned space ent	ту реглиіt have been met	met and I authorize entry into					
Relief Entry Supervisor: (print) I certify that the requirements of this confined space entry permit have been the confined space to which this permit applies.	ned space ent	ry pennit have been met	met and I authorize entry into	e entry into				
Entrants(s): (print)								
Attendant(s): (print)								
Permit Canceled by: Permit was cancelled because (check one): (i) Work has been	ck one): (i)		Date:	(ii) The permit has expired	Time:	(iii) Emergency (specify)	()	

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies, where electricity is used, electrical systems are installed or maintained, or where live electrical circuits are accessed. For work around overhead or underground utilities, see <u>SMS 34</u>, "Utility Clearances".

2. Purpose and Scope

This procedure describes requirements for working on electrical circuits with voltage greater than 50 volts. The primary hazards related to electricity are shock, burns, arc-blast, fire and explosions. This procedure is intended to reduce worker risk to electrical hazards.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure.

4. Requirements

- A. Any work performed on live electrical systems must be done by a licensed or journeyman electrician.
- B. Follow established lockout/tagout procedures. Refer to <u>SMS 23</u>, "Lockout and Tagout Safety".
 - 1. Consider all electrical systems as live until verified de-energized and grounded.
 - 2. Do not work on or in close proximity to electrical circuits unless the circuit is de-energized, grounded or guarded.

C. Hazardous Locations

Determine if electric equipment and wiring will be installed in locations that are classified depending on:

 The properties of flammable vapors, liquids or gases, or combustible dusts or fibers that may be present; as well as the likelihood that a flammable or combustible concentration or quantity

is present. Refer to <u>Attachment 12-1</u> for definitions of hazardous locations.

- 2. Consult Resources A, B, F, and G for information on working in classified locations.
- D. Ground Fault Circuit Interrupters and Grounding
 - 1. Ground Fault Circuit Interrupters
 - a. Provide approved ground-fault circuit interrupters for all 120-volt, single phase, 15- and 20-ampere receptacle outlets on construction sites.
 - b. Provide ground-fault circuit interrupters for all 120-volt, single phase, 15-and 20-ampere receptacle outlets within garages, bathrooms, kitchens and shops.

2. Grounding/Earthing

Effectively ground all wiring, electrical circuits, and equipment, except portable tools & appliances protected by an UL-approved system of double insulation. Examples of equipment requiring grounding include:

- a. Portable and vehicle or trailer mounted generators.
- b. Electrically powered arc welders.
- c. Switches.
- d. Motor controller cases.
- e. Fuse boxes.
- f. Distribution cabinets.
- g. Frames.
- h. Non-current-carrying rails used for travel and motors of electrically operated cranes.
- i. Electric elevators.

j. Metal frames of non-electric elevators to which electric conductors are attached.

E. Circuits

- 1. Require that there are no missing blanks.
- 2. Close doors to circuit and fuse boxes when not in use.
- 3. Label every circuit located on a circuit breaker/fuse box and/or motor control center (MCC).
- F. Temporary Wiring, Electrical Tools and Extension Cords
 - 1. Require that temporary wiring is installed and used in accordance with references. Specifically:
 - a. Guard, bury or isolate by elevation temporary wiring to prevent accidental contact by workers and equipment.
 - Require that vertical clearance above walkways is not less than 10 feet (3 metres) from circuits carrying 600 volts or less.
 - c. Support all exposed temporary wiring on insulators.
 - d. Protect temporary wiring from accidental damage.
 - e. Guard live parts of wiring.
 - f. Mark temporary power lines, switch boxes, receptacle boxes, metal cabinets and enclosures around equipment to indicate the maximum operating voltage.
 - 2. Require that lighting strings are installed and used in accordance with Resources A and B. Specifically:
 - a. Use nonconductive lamp sockets and connections permanently molded to the conductor insulation.
 - b. Require that lighting strings have lamp guards.
 - c. Replace all broken or defective bulbs promptly.

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- d. Protect all lights used for illumination from accidental contact or breakage.
- e. Ground metal-case sockets.
- Require that extension cords are installed and used in accordance with Resources A and B. Specifically:
 - a. Use only 3-wire grounded type extension cords designated for hard service or extra hard service and listed by Underwriters Laboratories, Inc.
 - b. Check cords for damage before use and daily thereafter.
 - c. Do not exceed the rated load.
 - d. Do not use spliced cords.
 - e. Destroy and discard worn or frayed cords.
 - f. Do not fasten extension cords with staples, hang them by nails or suspend them by wire.
 - g. Do not wrap cords or cables around any conductive materials.
- 4. Require that portable electric tools brought onto the site are in good condition. Before use on any shift, visually inspect portable cord and plug connected equipment for external defects and evidence of possible internal damage.
- G. Report to supervision potential electrical hazards or unexpected occurrences while electrical renovation or construction occurs.
- H. Tests shall be performed on cord sets and receptacles before each use, or before return to service following repair or thereafter at intervals not to exceed 3 months in accordance with 1926.404 (b)(1)(iii)(D) and 1926.404 (b)(1).
- 1. Keep accurate records of all pertinent work performed on a project.
 - 1. Keep as-built designs updated.
 - 2. Share information on modifications with contractors on site.

- J. Use of equipment that does not meet the requirements of this standard is not permitted.
- K. Isolation of live electrical components

Isolate all live, unprotected electrical components through the use of barricades, fencing or other means to protect employees from contact.

L. Briefing

- 1. Brief workers on electrical hazards at the beginning of the job. Utilize Attachment 12-2 as a guide for proper PPE as applicable.
- 2. Brief new workers entering the site.
- 3. Brief workers when electrical conditions change or when hazards exist.

M. Inspection

Inspect the job site periodically using <u>Attachment 12-3</u> to evaluate compliance with this standard.

5. Documentation Summary

Project Safety Files

- A. Licensed/journeyman electrician for project (as necessary).
- B. Attachment 12-3,"Audits."
- C. Documented communications between URS, contractors, licensed/journeyman electricians, or others.

6. Resources

- A. U.S. OSHA Standard <u>General Industry Electrical Safety</u> -29 CFR 1910, Subpart S
- B. U.S. OSHA Standard <u>Construction Electrical Safety</u> -29 CFR 1926, Subpart K
- C. U.S. OSHA Standard <u>Design Safety Standards for Electrical Systems</u> -29 CFR 1910, Subpart S

- D. U.S. OSHA Standard <u>The Control of Hazardous Energy</u> (<u>Lockout/Tagout</u>) 29 CFR 1910.147
- E. Australian Standards SAA HB94-1997 Electrical Safety in the Workplace
- F. American National Standards Institute/Institute of Electrical and Electronics Engineers National Electrical Safety Code (NESC), ANSI/IEEE C2-2002
- G. <u>National Fire Protection Association</u>, National Electric Code, NFPA-70 The following documents are PDF files requiring the use of Adobe Acrobat reader.
- H. Attachment 12-1 Hazardous Locations
- I. Attachment 12-2 PPE, Tools and Equipment
- J. Attachment 12-3 Electrical Hazard Check Sheet



Attachment 12-1

HAZARDOUS LOCATIONS



Class I locations are those in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. Class I locations include the following:

- A. Class I, Division 1 location is a location:
 - 1. In which ignitable concentrations of flammable gases or vapors may exist under normal operating conditions; or
 - 2. In which ignitable concentrations of such gases or vapors may exist frequently because of repair or maintenance operations or because of leakage; or
 - 3. In which breakdown or faulty operation of equipment or processes might release ignitable concentrations of flammable gases or vapors, and might also cause simultaneous failure of electric equipment.
- B. Class I, Division 2 location is a location:
 - In which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the hazardous liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment; or
 - In which ignitable concentrations of gases or vapors are normally prevented by positive mechanical ventilation, and which might become hazardous through failure or abnormal operations of the ventilating equipment; or
 - 3. That is adjacent to a Class I, Division 1 location, and to which ignitable concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air, and effective safeguards against ventilation failure are provided.

"Class II Locations"

Class II locations are those that are hazardous because of the presence of combustible dust. Class II locations include the following:



Attachment 12-1

HAZARDOUS LOCATIONS

- A. Class II, Division 1 location is a location:
 - In which combustible dust is or may be in suspension in the air under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures; or
 - Where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices, or from other causes, or
 - 3. In which combustible dusts of an electrically conductive nature may be present.
- B. Class II, Division 2 location is a location in which:
 - Combustible dust will not normally be in suspension in the air in quantities sufficient to produce explosive or ignitable mixtures, and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus; or
 - 2. Dust may be in suspension in the air as a result of infrequent malfunction of handling or processing equipment, and dust accumulations resulting therefrom may be ignitable by abnormal operation or failure of electrical equipment or other apparatus.

"Class III Locations"

Class III locations are those that are hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures. Class III locations include the following:

- A. Class III, Division 1 location is a location in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.
- B. Class III, Division 2 location is a location in which easily ignitable fibers are stored or handled, except in process of manufacture.



Attachment 12-2

PPE, TOOLS AND EQUIPMENT NEEDED DURING ELECTRICAL WORK

Revision 1: March 2005

If there is a danger of:	Then use the following:
Head injury from electric shock, or	Nonconductive head protection – Class
Burns due to contact with exposed energized parts	II nonconductive hard hat
Injury to the eyes or face from:	Protective equipment for the eyes and
Electric arcs or flashes; or	face – face shield and safety glasses
Flying objectives resulting from electrical explosion	
Shock to hands while handling energized wires	Lineman's rubber insulated gloves rated for the voltage exposed to. Leather overgloves may be needed if exposure to abrasive surfaces is possible.
Shock while working in areas where high voltage electrical systems are present, or	Non-conductive protective foot wear
Shock when performing electrical repairs	Drotostivo ocuprella mada of Names:
Exposure to electric arcing or flashing from:	Protective coveralls made of Nomex or other suitable flash-proof material.
Opening or closing 2400 volt oil cutout switching devices;	
Removing or installing links in high voltage able tap boxes; or	
Removing or installing fuses in high voltage circuits.	
	THEN
Energized parts are exposed.	Use nonconductive ropes and handlines near the exposed energized part.
Working near exposed energized conductors or circuit parts.	Use insulated tools or handling equipment if the tools or handling equipment might make contact with such conducts or parts.
The insulating capability of insulated tools or handling equipment is subject to damage.	Protect the insulating material.
Removing or installing fuses when the fuse terminals are energized.	Use fuse-handling equipment insulated for the circuit voltage.
Working near exposed energized parts that might be accidentally contacted or	Use protective shields, protective barriers, or insulating materials to protect from shock, burns, or other
where dangerous electric heating or arcing might occur.	electrically related injuries. Guard the parts to protect unqualified



ELECTRICAL HAZARD CHECKLIST

Attachment 12-3

Revision 1: March 2005

Location Inspected	: Job No.:	
Date Inspected: _	Name of Inspector:	

Check Yes, No or N/A for Not Applicable. If comment is required, circle the number and see Page 3.

		Yes	No	N/A
. Ç	Electrical Equipment Markings			17 7 3 47 84 1
1.	Disconnecting switches and circuit breakers are labeled to indicate their use or equipment served.		_	
2.	The necessary voltage, wattage, or current ratings are labeled.			
3.	Circuit breakers clearly indicate whether they are in the "on" or "off" position.			
	Electrical Grounding			
4.	Extension cords used have a grounding conductor (third plug).			
5.	Ground fault circuit interrupters are installed as required.			
6.	Portable electrical tools and equipment are of the double insulated type.			
7.	Ground fault circuit interrupters open the circuit on a ground current of 5 milliamperes or greater and are equipped with an integral push button test circuit.			
8.	Ground fault circuit interrupters are installed in accordance with the manufacturer's instructions.			
9.	Ground fault circuit interrupters are tested prior to initial use and periodically thereafter.			
10.	Grounding rods are at least 5/8-inch diameter steel or iron rods, ½-inch diameter copper clad steel, or ¾-inch diameter galvanized pipe.			
11.	Grounding rods are in eight-foot lengths and driven to full depth.			
	The path from circuits, equipment, structures, and conduits or enclosures to ground are:			
12.	Permanent and continuous.			
13.	Have ample carrying capacity for the current likely to be imposed on it.			
14.	Have resistance sufficiently low to permit current flow to operate circuit breakers and similar overcurrent devices on the circuit.			
15.	Driven ground rod electrodes have a resistance to ground not exceeding 25 ohms.			į
16.	Upon installation of the driven ground rod electrode, the resistance was tested and recorded.			
17.	Conductors, used for bonding and grounding circuits, are of sufficient size to carry the anticipated current.			
18.	Grounds are not removed until all work is complete.			



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ELECTRICAL HAZARD CHECKLIST

		Yes	No	N/A
284 (85%) 284 (85%)	Electrical Guarding			00000 1 10000
19.	Switches, receptacles, etc. are provided with tight-fitting covers or plates.			
20.	All energized parts of electrical circuits and equipment are guarded against accidental contact by approved cabinets or enclosure.			
21.	All unused openings (including conduit knockouts) in electrical enclosures and fittings are enclosed with appropriate covers, plugs or plates.			
22.	Ground-fault circuit interrupters are installed on each temporary 15 or 20 ampere, 120 volt AC circuit at locations where construction, demolition, modifications, alterations or excavations are being performed.			
23.	Electrical switches and breakers (rated 440 volts or greater) are provided with a means for locking them out in the OFF position.			
	Electrical Systems			
24.	Circuit breakers accessible to personnel are protected from physical damage, and located away from ignitable material.			· · · · · · · · · · · · · · · · · · ·
25.	Weatherproof cabinets or enclosures are used when switches, circuit breakers, fuse panels and motor controllers are in a wet or outside location.			-1
26.	A readily accessible, manually operated switch is provided for each incoming service or supply circuit rated less than 5 kilovolts.			
27.	Electrical raceways and enclosures are securely fastened in place.			
28.	Overcurrent protection is provided for fuses or circuit breakers for each feeder and branch circuit.			
29.	Insulting fuse tongs or extractors are used when removing fuses from circuits rated 50-600 volts.			
30.	Fuse cabinets have close-fitting doors that can be locked.			
e la la c	Extension Cords			
31.	Clamps or other securing means are provided on flexible cords or cables at plug receptacles, tools, equipment, etc. and the cord jacket is securely held in place.			
32.	Flexible cords and cables are free of splices and taps.			
33.	Only 3-wire grounded type extension cords, designated for hard or extra hard service, are used.			
34.	Extension cords are listed by Underwriters Laboratories, Inc.			
35.	Extension cords are checked for damage before use.			
36.	The rated load on extension cords is not exceeded.			
37.	Extension cords are not fastened with staples, hung by nails or suspended by wire.			
v a	Temporary Wiring			No. of Assets
38.	Temporary wiring is guarded, buried or isolated by elevation to prevent accidental contact by workers and equipment.			



ELECTRICAL HAZARD CHECKLIST

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39.	A stight described the second			
	A vertical clearance above walkways for temporary wiring is not less than ten feet from circuits carrying 600 volts or less.			
40.	All exposed temporary wiring is supported on insulators.			
41.	Temporary wiring is protected from accidental damage.			
42.	Nonconductive lamp sockets and connections are permanently molded to the conductor insulation on lighting strings.			
43.	Lighting strings have lamp guards.			
44.	Broken or defective bulbs are replaced promptly.			
45.	Lights are protected from accidental contact or breakage.			
46.	Wiring installed in conduit is equipped with bushings at outlets and terminals.			
47.	Receptacles are of the grounding type, and electrically connected to the equipment-grounding conductor.			
	Worker Practices	Jadi's	en F	547 }
48.	Personnel performing electrical repairs are properly trained and "qualified".			
49.	Workers de-energize, ground or guard electric circuits before working in close proximity.]
50.	Workers consider all electrical systems as live until verified de-energized and grounded.			
51.	Proper lockout tag-out procedures are used for de-energizing electric circuits.			
	Equipment			
52.	Only fiberglass or wood ladders are used when working near electrical hazards.			
53.	Insulation mats are placed on floors and on frames of equipment when working on energized equipment.			
3 - 3 - 1 W - 1 - 1	Personal Protective Equipment	·		
54.	Rubber matting, blankets, insulated sleeves, and rubber gloves are inspected before use.			
55.	Workers use safety glasses and face shields during work activities where there is a reasonable probability of eye injury.			

COMMENTS:

1. Applicability

This standard applies to projects where URS controls trenching and excavation activities and/or where URS employees are exposed to hazards associated with trenching and excavation activities.

2. Purpose and Scope

This standard is intended to protect personnel from the hazards associated with excavation entry activities.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure

4. Requirements

A. Competent Person

Appoint an Excavation Competent Person when URS controls excavation activities. The Excavation Competent Person:

- 1. Is responsible for conducting daily inspections of excavations, adjacent areas, and protective systems prior to each shift.
- 2. Is responsible for inspection after every rainstorm or other hazard.
- 3. Must have knowledge of soils and soil classification.
- 4. Understands design and use of protective systems.
- 5. Has authority to stop work and take corrective actions when conditions change.
- 6. Has the ability to recognize and test hazardous atmospheres.
- 7. Has formal documentation of training as an Excavation Competent Person.
- 8. Is physically located at the excavation while work is in progress.

B. Access/Egress

Trench excavations will have ramps or ladders within 25 feet (8 meters) of the entrants.

C. Soil Classification

1 1

Soil classifications must be conducted in accordance with <u>Attachment 13-1</u>, if a sloping or benching system is issued. For the purposes of this standard all soils will be classified by a person meeting the qualifications of a competent person as described in 29 CFR 1929 Subpart P. The competent person shall consult with a Registered Professional Engineer in the event the soil classification requires additional technical expertise.

D. Protective Systems

Protect employees in excavations deeper than 4 feet (1.2 meters) by means of properly designed protective systems. All protective systems must comply with 29 CFR 1926 Subpart P Appendices B, C, D, and E.

Sloping and Benching

See Attachment 13-2.

2. Timber Shoring for Trenches

Timber shoring for trenches must be designed and stamped by a Registered Professional Engineer in accordance with 29CFR Subpart P, Appendix C.

Aluminum Hydraulic Shoring for Trenches

Aluminum hydraulic shoring for trenches must be approved by a Registered Professional Engineer in accordance with 29CFR 1926 Subpart P, Appendix D.

4. Alternatives to Timber Shoring

Trench shields and boxes must be either be pre-manufactured with listed load ratings or designed, stamped and constructed under the direction of a Registered Professional Engineer. See <u>29 CFR 1926 Subpart C</u>, Appendix E for examples.

- 5. Protective systems designed to protect employees in excavations deeper than 20 feet (6.1 meters) must be designed and stamped by a Registered Professional Engineer.
- 6. Excavations will be clearly identified and barricaded to keep unauthorized individuals out.
- E. Permit Authorization and Inspections
 - 1. Use the Excavation Authorization Form (<u>Attachment 13-3</u>) of this procedure that requires the following issues to be addressed:
 - a. Employee training/briefings.
 - b. Electrical safety.
 - c. Surface encumbrances.
 - d. Underground installations and utilities.
 - e. Protective systems.
 - f. Access and egress.
 - g. Exposure to vehicular traffic.
 - h. Exposure to falling loads.
 - i. Warning systems for mobile equipment.
 - Testing for hazardous atmospheres.
 - k. Emergency rescue equipment.
 - I. Protection from hazards associated with water accumulation.
 - m. Stability of adjacent structures.
 - n. Protection of employees from loose rock.
 - o. Inspections.
 - p. Fall protection.

2. Require daily inspections of excavations to be conducted by Competent Person using <u>Attachment 13-4</u>.

F. Excavating at Potential MEX/UXO Sites

If the project site is suspected of munitions and explosives of concern (MEC) or unexploded ordinance (UXO) contamination, the UXO team will conduct a reconnaissance and MEC/UXO avoidance to provide clear access routes to each site prior to excavation crews entering the area.

MEC/UXO sites with planned excavation activities will not be conducted until a complete plan for the site is prepared and/or approved by URS UXO Safety Officer. MEC/UXO avoidance must be conducted during excavation operations on known or suspect MEC/UXO sites (SMS 039)

G. Training/Briefings

Conduct daily safety briefings for all employees associated with excavation activities and document on <u>Attachment 13-3</u>. Discuss excavation hazards, protective measures, and work practices that will be applicable to the day's activities.

5. Documentation Summary

Records required for the Project Safety File:

- A. Competent person qualifications.
- B. Excavation Authorization Form.
- C. Daily Competent Person inspections.
- D. Daily worker briefing documentation.
- E. Daily inspection records.

6. Resources

- A. U.S. OSHA Standard Excavations 29 CFR 1926, Subpart P
 - 1. Appendix B, Sloping and Benching
 - 2. Appendix C, Timber Shoring
 - 3. Appendix D, Aluminum Hydraulic Shoring

- 4. Appendix E, Alternatives to Timber Shoring
- B. U.S. OSHA Technical Links Trenching and Excavation
- C. US Army Corp of Engineers projects, the requirements of <u>EM 385-1-1</u>, Section 25 (PDF file)
- D. Queensland Workplace Health and Safety <u>Workplace Health and Safety Regulation Part 17 (Excavations)</u>
- E. Attachment 13-1 Soils Classification
- F. Attachment 13-2 Simple Slopes
- G. Attachment 13-3 Excavation Authorization Form
- H. Attachment 13-4 Daily Excavation/Trench Inspection Form



SOILS CLASSIFICATION

Attachment 13-1

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"Type A" soils

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1_...}

Cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144kPa) or greater. Examples of cohesive soils are clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A.

However, no soil is Type A if:

- 1. The soil is fissured;
- 2. The soil is subject to vibration from heavy traffic, pile driving, or similar effects;
- 3. The soil has been previously disturbed;
- 4. The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V)or greater; or
- 5. The material is subject to other factors that would require it to be classified as a less stable material.

"Type B" soils

- 1. Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
- 2. Granular cohesionless soils including angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
- 3. Previously disturbed soils except those which would otherwise be classed as Type C soil.
 - a. Soil that Dry rock that is not stable; or
 - b. Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

"Type C" soils

- 1. Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less;
- 2. Granular soils including gravel, sand, and loamy sand:
- 3. Submerged soil or soil from which water is freely seeping;
- 4. Submerged rock that is not stable, or
- 5. Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.



Attachment 13-2

SIMPLE SLOPES

MAXIMUM ALLOWABLE SLOPES SOIL OR ROCK TYPE MAXIMUM ALLOWABLE SLOPES (H:V)¹ FOR EXCAVATIONS LESS THAN 20 FEET DEEP³

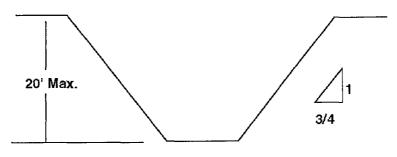
STABLE ROCK	VERTICAL (90 Deg.)
TYPE A ²	34:1 (53 Deg.)
TYPE B	1:1 (45 Deg.)
TYPE C	1 ½:1 (34 Deg.)

Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

Slope Configurations (All slopes stated below are in the horizontal to vertical ratio)

Excavations Made in Type A Soil

All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of $\frac{3}{2}$:1.



SIMPLE SLOPE - GENERAL

Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of ½:1.

² A short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavation in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53 degrees).

³ Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.



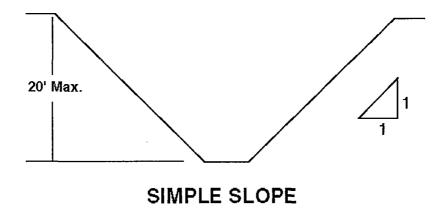
1....}

Health, Safety and Environment SIMPLE SLOPES

Attachment 13-2

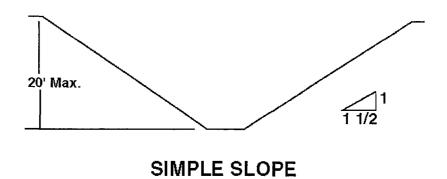
Excavations Made in Type B Soil

All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.



Excavations Made in Type C Soil

All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of $1\frac{1}{2}$:1.





Attachment 13-3

EXCAVATION / TRENCHING AUTHORIZATION

POST AT LOCATION

	(GOOD FOR O	NE WEEK ONLY)			
Author	ization No.	Authorization From			
Compe	etent Person:	TO:			
Projec	t Name:	Project Location:	•		
Descri	ption or Job Special Procedures:				
				s, No, c Applica	
EMPL	OYEE TRAINING AND PRE-EXCAVATION				
1. Sa	fe Excavation and Rescue Training Conducted on	: Date:			
2. Ma	andatory pre-excavation briefing conducted on:	Date:			
			Yes	No	N/A
3. Do	es this job require special training?				
FLEC	TRICAL SAFETY		 -		
LLLO	MOALOAILII		Yes	No	N/A
1. Are					
	ve all power cords and tools been visually inspect				
SURF	ACE ENCUMBRANCES		· · · · · · · · · · · · · · · · · · ·		,
	ive all surface encumbrances that are located so a en removed or supported, as necessary, to safegu		i		
-, · · · ,	,		.l	1	L
UNDE	RGROUND INSTALLATIONS				
	ive the estimated locations of all underground insta cavation?	allation been determined prior to			
2. Ha	ve utility companies been contacted and advised of	of proposed work?			
	e underground installations protected, supported o en?	r removed while excavations are			
	ECTIVE SYSTEMS		T		_[
	cavation slopes comply with Type C Soil Classifica		 -		<u> </u>
2. If r	. If no to question 1, has soil been examined and been determined to be other than Type				



Attachment 13-3

EXCAVATION / TRENCHING AUTHORIZATION

		,	Yes	No	N/A
	C soil by a Competent Person?				<u> </u>
3.	If protective measures beyond sloping are required, do they meet OSHA Apstandards?	ppendix			
\$.	If no to question 3, has the protective system been designed and stamped Registered Professional Engineer?	by a			
ME	EANS OF EGRESS FOR TRENCHES DEEPER THAN 4 FEET	·			
1.	Are stairways, ladders, or ramps provided every 25 feet?				
AC	CCESS AND EGRESS				
1.	Are structural ramps that are used solely by personnel as a means of accesfrom excavations designed by a competent person?	ss or egress			
2.	Are ramps and runways constructed so structural members are connected displacement?	to prevent			
3.	Are structural ramps that are used for access and egress of equipment des competent person qualified in structural design and constructed in accorda design?				
4.	Are structural members used for ramps and runways of uniform thickness?				
5.	Are cleats used in connecting runway structural members attached in a ma prevent tripping?	nner to			
6.	Are structural ramps used in lieu of steps provided with cleats or other surfato prevent slipping?	ace treatment			
ΕX	XPOSURE TO VEHICULAR TRAFFIC				
1.	Are personnel exposed to public vehicular traffic wearing reflectorized or hivests?	gh visibility	,		
ΕX	XPOSURE TO FALLING LOADS				
1.	Are employees prohibited from standing underneath loads handled by lifting equipment?	g or digging			
2.	Are employees prohibited from standing next to vehicles being loaded or un	nloaded?			
W	ARNING SYSTEMS FOR MOBILE EQUIPMENT				
1.	Are warning systems such as barricades, hand or mechanical signals, or st utilized when mobile equipment is operated adjacent to or at the edge of ar				
TE	ESTING FOR HAZARDOUS ATMOSPHERES				
1.	Are the atmospheric hazards that can be reasonably expected to exist in exgreater then 4 feet deep tested and controlled?	cavations			
	READING:	TIM	IE:	<u>INI</u>	TIAL:
2.	Test of Oxygen Content:	nimum)			
3.	Test for Flammable Concentrations: % LEL (10% Ma	ıximum)			



Attachment 13-3

EXCAVATION / TRENCHING AUTHORIZATION

		Yes	No	N/A				
4.	Test for Toxic Concentration: %PPM of							
5.	Is testing conducted as often as necessary to ensure safety personnel?		<u> </u>					
E۱	EMERGENCY RESCUE EQUIPMENT							
1.	Is emergency rescue equipment such as SCBA, safety harness and line, or basket stretcher readily available and attended when hazardous atmospheric conditions exist?							
2.	Are employees who enter bell-bottom pier holes or other similar deep and confining excavations wearing a body harness with a life-line?							
PR	OTECTION FROM HAZARDS ASSOCIATED WITH WATER ACCUMULATION	ON						
1.	Are employees prohibited from entering excavations that have accumulated water?							
2.	Is water being controlled or prevented from accumulating in excavation by the use of water removal equipment?	<u></u>						
3.	Is water control equipment operation being monitored by a competent person?	İ						
4.	Are diversion ditches, dikes, or other suitable means used to prevent surface water from entering excavation?							
5.	Are excavations subjected to run-off from heavy rain immediately re-inspected by a competent person?							
PR	OTECTION OF EMPLOYEES FROM LOOSE ROCK OR SOIL		·					
1.	Is adequate protection provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face?							
2.	Are employees protected from excavated or other material and equipment by placing this material a minimum of two (2) feet from the edge of excavations or by the use of retraining devices?							
ST	ABILITY OF ADJACENT STRUCTURES							
1.	Are support systems such as shoring, bracing, or underpinning provided to ensure stability of adjoining structures (i.e., buildings, walls) endangered by excavation activities?							
2.	Has any excavation below the level of the base or footing of foundations or retaining walls been:							
	Provided with a support system such as under pinning to ensure the safety of employees and stability of the structure?							
	Performed in stable rock?	<u> </u>						
	Determined by a registered professional engineer that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity?							
	Determined by a registered professional that the excavation work will not pose a hazard to employees?							
3.	Is the undermining of sidewalks and pavement structures prohibited?							
INS	SPECTIONS							
î.	Are daily inspections of excavations where employee exposure can be reasonably anticipated being done by the competent person?							
2.	Are inspections being performed by a competent person after every rainstorm or other hazard increasing occurrence?							



Attachment 13-3

EXCAVATION / TRENCHING AUTHORIZATION

		Yes	No	N/A
3.	Are employees removed from the excavation if the competent person finds evidence at	1		
	any time of a situation that could result in a possible cave-in, protective system failure,	1		
	hazardous atmosphere or other hazardous condition?		ĺ	

FALL PROTECTION

1.	Are standard guardrails provided on walkways and bridges that cross over excavations?		
2.	Are all remotely located excavations adequately barricaded or covered?		
3.	Are temporary wells, pits, shafts and similar exploratory operations backfilled upon		
	completion?		1

I have inspected the excavation described in this authorizati	on:
Signature of Competent Person	Date



EXCAVATION / TRENCHING

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POST AT LOCATION

			E WEEK ONLY)			
Au	thorization No.		Authorization From			
Cc	mpetent Person:		То:		-	
Pro	pject Name:		Project Location:			
De	scription or Job Special Procedures:				1,0.7	
					•	
				eck Ye		
F٨	IPLOYEE TRAINING AND PRE-EXCA	/ΔΤΙΩΝ		or Not	Applica	able
1.	Safe Excavation and Rescue Training Condu		Date:			·
2.	Mandatory pre-excavation briefing conducted		Date:			
				Yes	No	N/A
3.	Does this job require special training?					
EL	ECTRICAL SAFETY					
1.	Are all electrical devices grounded, double in	sulated, o	r GFCI protected?	T		
2.	Have all power cords and tools been visually	inspected	?			
SL	IRFACE ENCUMBRANCES		· · · · · · · · · · · · · · · · · · ·		,	
1.	Have all surface encumbrances that are loca been removed or supported, as necessary, to					
UN	IDERGROUND INSTALLATIONS					
1.	Have the estimated locations of all undergrouexcavation?	und installa	ation been determined prior to			
2.	Have utility companies been contacted and a	dvised of	proposed work?	1		
3.	Are underground installations protected, suppoper?	ported or r	emoved while excavations are			



EXCAVATION / TRENCHING

Attachment 13-3

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PR	OTECTIVE SYSTEMS	Yes	No	N/A
1.	Excavation slopes comply with Type C Soil Classification?	- Sept.		
2.	If no to question 1, has soil been examined and been determined to be other than Type C soil by a Competent Person?			
3.	If protective measures beyond sloping are required, do they meet OSHA Appendix standards?			
4.	If no to question 3, has the protective system been designed and stamped by a Registered Professional Engineer?			
ME	EANS OF EGRESS FOR TRENCHES DEEPER THAN 4 FEET			
1.	Are stairways, ladders, or ramps provided every 25 feet?		<u> </u>	
	CESS AND EGRESS	T		
1.	Are structural ramps that are used solely by personnel as a means of access or egress from excavations designed by a competent person?			
2.	Are ramps and runways constructed so structural members are connected to prevent displacement?			
3.	Are structural ramps that are used for access and egress of equipment designed by a competent person qualified in structural design and constructed in accordance with the design?			
4.	Are structural members used for ramps and runways of uniform thickness?			
5.	Are cleats used in connecting runway structural members attached in a manner to prevent tripping?			
6.	Are structural ramps used in lieu of steps provided with cleats or other surface treatment to prevent slipping?			
EX	POSURE TO VEHICULAR TRAFFIC			
1.	Are personnel exposed to public vehicular traffic wearing reflective or high visibility vests?			
EX	POSURE TO FALLING LOADS			
1.	Are employees prohibited from standing underneath loads handled by lifting or digging equipment?			
2.	Are employees prohibited from standing next to vehicles being loaded or unloaded?			
W	ARNING SYSTEMS FOR MOBILE EQUIPMENT		_	
1.	Are warning systems such as barricades, hand or mechanical signals, or stop logs utilized when mobile equipment is operated adjacent to or at the edge of an excavation?			



EXCAVATION / TRENCHING

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TE	TESTING FOR HAZARDOUS ATMOSPHERES			No	· N/A
1.	1. Are the atmospheric hazards that can be reasonably expected to exist in excavations greater then 4 feet deep tested and controlled?				
		READING:	TIME:	<u>INIT</u>	IAL:
2.	Test of Oxygen Content:	% 02 (19.5% Minimum)			
3.	Test for Flammable Concentrations:	% LEL (10% Maximum)			
4.	Test for Toxic Concentration:	%PPM of			
5.	Is testing conducted as often as necessar	y to ensure safety personnel?			
ΕN	MERGENCY RESCUE EQUIPMENT				
1.	Is emergency rescue equipment such as stretcher readily available and attended w	SCBA, safety harness and line, or basket hen hazardous atmospheric conditions exist?			
2.	Are employees who enter bell-bottom pier excavations wearing a body harness with				
		DCIATED WITH WATER ACCUMULATION	ON		
1. 2.	Are employees prohibited from entering ex		-		
۷.	Is water being controlled or prevented from accumulating in excavation by the use of water removal equipment?				
3.	Is water control equipment operation being monitored by a competent person?				
4.	4. Are diversion ditches, dikes, or other suitable means used to prevent surface water from entering excavation?				
5. Are excavations subjected to run-off from heavy rain immediately re-inspected by a competent person?					
PF	OTECTION OF EMPLOYEES FROM	I LOOSE ROCK OR SOIL			
1.	Is adequate protection provided to protect pose a hazard by falling or rolling from an	employees from loose rock or soil that could excavation face?			
2.		or other material and equipment by placing m the edge of excavations or by the use of			<u>-</u>
ST	ABILITY OF ADJACENT STRUCTU	RES			
1.	Are support systems (e.g., shoring, bracin of adjoining structures (i.e., buildings, wall	g, or underpinning) provided to ensure stability s) endangered by excavation activities?			
2.	of adjoining structures (i.e., buildings, walls) endangered by excavation activities? Has any excavation below the level of the base or footing of foundations or retaining walls been:				
	Provided with a support system such as employees and stability of the structure?				
	Performed in stable rock?				
	Determined by a registered professional removed from the excavation so as to be	e unaffected by the excavation activity?			

URS

Health, Safety, and Environment

EXCAVATION / TRENCHING

Attachment 13-3

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	Determined by a registered professional that the excavation work will not pose a hazard to employees?		
3.	Is the undermining of sidewalks and pavement structures prohibited?		

INSPECTIONS		Yes	No	N/A
1.	Are daily inspections of excavations where employee exposure can be reasonably anticipated being done by the competent person?			
2.	Are inspections being performed by a competent person after every rainstorm or other hazard increasing occurrence?			
3.	Are employees removed from the excavation if the competent person finds evidence at any time of a situation that could result in a possible cave-in, protective system failure, hazardous atmosphere or other hazardous condition?			

FALL PROTECTION

1.	Are standard guardrails provided on walkways and bridges that cross over excavations?		
2.	Are all remotely located excavations adequately barricaded or covered?		
3.	Are temporary wells, pits, shafts and similar exploratory operations backfilled upon completion?		

I have inspected the excavation described in this authorization:

Signature of Competent Person	Date



Health and Safety Program

Attachment 13-4

DAILY EXCAVATION / TRENCH INSPECTION REPORT

Revision 2: March 2005

Competent Person:	Date:
Project Name:	Weather Conditions:
Projection Location:	Rainfall Amounts 24 Hours Previous:

Check Yes, No or N/A for Not Applicable. If comment is required, circle the number and see Page 2.

		Yes	' No	N/A
1.	Are barricades or covers in place and in good condition?			
2.	Have tension cracks been observed along the top on any slopes?			
3.	Is excavated material at least 2' from the edge of the excavation?			
4.	Are slopes cut at design angle of repose?			
5.	Is any water seepage noted in trench walls or bottom?			
6.	Are pumps in place or available if needed?			
7.	Is bracing system installed in accordance with design?			
8.	Is there evidence of significant fracture planes in soil or rock?			
9.	Is there any evidence of caving or sloughing of soil since the last inspection?			
10.	Are there any zones of unusually weak soils or materials not anticipated?			
11.	Are there any noted dramatic dips or bedrock?			
12,	Are all short-term trench(s) covered within 24 hours?			
13.	Have non-compliance items been photographed?			
14.	Are hydraulic shores pumped to design pressure?			
15.	Is shoring being used secure?			
16.	Does plan include adequate safety factor for equipment being used?			
17.	Is traffic adequately away from trenching operation?			
18.	Are barricades up and secure?			
19.	Are there trees, boulders or other hazards in area?			
20.	Is vibration from equipment or traffic to close to trenching operation?			
21.	Are trench box(s) certified?			
22.	Are GFCIs used on ALL temporary electrical cords?			
23.	Is access and egress located within 25 feet of entrants?			
24.	Is hazardous testing done on a regular basis?			
25.	Has rescue procedure been established and is equipment immediately available?			

[&]quot;I hereby attest that the following conditions existed and that the following items were checked or reviewed during this inspection".



Health and Safety Program

Attachment 13-4

Revision 2: March 2005

DAILY EXCAVATION / TRENCH INSPECTION REPORT

Comments: Place question number in front of applicable comment.

URS SAFETY MANAGEMENT STANDARD Fire Prevention

1. Applicability

This procedure applies to URS Corporation, and its subsidiary companies, office and project locations.

2. Purpose and Scope

The purpose of this procedure is to reduce/eliminate potential fire hazards in the workplace and to provide for a rapid, effective response should a fire occur.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, Country or Strategic Business Unit Health, Safety and Environment Manager must approve deviations from this procedure.

4. Requirements

General

- A. Develop an Emergency Action Plan as outlined in <u>SMS 3</u>, "Emergency Action Plans."
- B. Maintain good housekeeping to reduce fire hazards and to provide safe routes of egress should a fire occur.
- C. Provide the appropriate number and types of fire extinguishers for the operations being performed. Refer to Attachment 14-1 for guidance.
- D. Inspect fire extinguishers monthly and maintain an inspection log. At a minimum, inspections will include the following:
 - 1. Fire extinguisher is mounted and on a bracket,
 - 2. Access to the fire extinguisher is not obstructed,
 - 3. Pin is in place,
 - 4. Charge indicator is in the full range (green area), and
 - 5. Fire extinguisher shows no indication of physical damage.

URS SAFETY MANAGEMENT STANDARD Fire Prevention

- E. Fire extinguishers shall be inspected annually by a qualified fire services contractor.
- F. Conduct frequent periodic workplace inspections to identify fire hazards such as:
 - 1. Unnecessary accumulation of combustibles (including paper and boxes).
 - 2. Unnecessary storage of flammables.
 - 3. Sources of ignition (e.g., faulty wiring, sparks, open flame, etc.).
- G. Remove all fire hazards promptly.
- H. Prohibit smoking and other ignition sources in flammable storage and other fire hazard areas.
- Extinguishers that are out of service or discharged shall be immediately tagged and removed from service and replaced.
- J. Post emergency numbers near telephones and evacuation maps in appropriate locations.
- K. Conduct evacuation drills at least annually.
- L. Train employees in:

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- 1. Fire hazard recognition.
- 2. Fire hazard prevention.
- 3. Fire extinguisher use.
- 4. Emergency and evacuation procedures.

6. Documentation Summary

File the following in the Office/Project Health and Safety File:

- A. Emergency Action Plans.
- B. Fire extinguisher inspection logs.
- C. Employee training documentation.



FIRE EXTINGUISHER PLACEMENT GUIDELINES

Attachment 14-1

Revision 1: Oct 2007

- C. At least one portable fire extinguisher, rated at least 20BC, must be provided on all tank trucks or other vehicles used for transporting and/or dispensing flammable/combustible liquids.
- D. At least one fire extinguisher, rated at least 20BC, must be provided within 75 feet (22.86 meters) of each pump, dispenser, underground fill pipe opening, and lubrication/service areas.
- E. At least one fire extinguisher, rated at least 20BC, must be provided at each LPG container storage area.

3. Hot Work

A minimum of one fire extinguisher, rated at least 20BC, must be provided for each hot work location. The extinguisher should be conspicuously positioned no more than 10 feet (3.04 meters) from the hot work. Refer to <u>SMS 20</u>, "Hot Work".

4. Motorized Construction Equipment

At least one portable fire extinguisher, rated at least 20BC, must be provided on each piece of motorized construction equipment.

5. Temporary Construction/Work Trailer

A minimum of one fire extinguisher, rated at a minimum of 2A, must be provided for each temporary construction/work trailer.

1. Applicability

This procedure applies to all operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

The purpose of this procedure is to provide information regarding the proper storage, handling and work practices associated with flammable and combustible liquids and gases.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, Country, or Strategic Business Unit (SBU) Health, Safety and Environment (HSE) Manager must approve deviations from this procedure.

4. Requirements

- A. Appoint a Responsible Person who will:
 - 1. Inspect storage areas monthly.
 - 2. Monitor the quantity of flammable and combustible liquids and gases on the site.
 - 3. Review work practices involving flammable and combustible liquids and gases.
 - 4. Determine if adequate hazard information is available for stored materials. See <u>SMS 002</u>, "Worker Right To Know," for more information.
- B. Control flammable and combustible liquids and gases entering the site by ordering only those materials and quantities that are needed to complete a job.

C. Storage

1. Store flammable and combustible materials in appropriate tanks and containers. See <u>Attachment 15-1</u>.

- 2. Limit building storage outside of a flammable storage cabinet or storage room. See <u>Attachment 15-1</u>.
- 3. Store oxidizers separately from flammables.
- 4. Segregate gas cylinders for storage based on their hazard. Keep oxygen and acetylene cylinders stored separately.

D. Labeling and Signage

- Post a "NO SMOKING OR OPEN FLAME" sign in all areas where flammable and combustible materials are stored, handled, and processed.
- 2. Require all containers and cylinders to be labeled with the contents and adequate hazard warning labels per SMS 002.

E. Use of Materials on Site

- Use flammable and combustible liquids and gases in a manner that is consistent with the label and material safety data sheet for the product.
- 2. Use only those amounts of materials needed for the job. Transfer of these materials ready use containers is encouraged.
- 3. Use personal protective equipment stated on the product label and material safety data sheet. Consult <u>SMS 29</u>, "Personal Protective Equipment," for additional information.
- 4. For dispensing and/or fueling operations, ensure:
 - a. Signs are posted with instructions on the dispensing or fueling process.
 - b. Operators have been trained in the dispensing or fueling process.
 - c. Dispensing or fueling is conducted in accordance with instructions provided in <u>Attachment 15-2</u>.
 - d. PPE is used during the dispensing or fueling process as required. See <u>SMS 029</u> and <u>Attachment 15-2</u> for additional information.

F. Spill Control

- 1. Have a written spill response plan in place before materials are stored or used on site.
- 2. Clean up or respond to spills promptly.

G. Disposal

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- 1. Keep solvent waste and flammable liquids in fire resistant, covered containers until they are removed from the worksite.
- 2. Do not place flammable or combustible waste in municipal garbage.
- 3. Dispose of flammable or combustible hazardous materials with a licensed hazardous material disposal company.

H. Inspection

- 1. Inspect flammable and combustible storage and use areas, gas storage areas on a monthly basis:
- 2. Use the inspection sheet provided as <u>Attachment 15-2</u> to inspect the storage areas.

Training

Require that hazard communication training include specific hazard information for the flammables and combustibles used.

J. Compliance

Review and comply with country and client/customer specific requirements.

5. Documentation Summary

- A. File these records in the Office, Project, or Site safety files:
 - 1. Location of the MSDS inventory
 - 2. Completed Flammable and Combustibles Inspection Checklist (Attachment 15-2).

6. Resources

- A. National Fire Protection Association Standard 58
- B. Regulations of the U.S. Coast Guard <u>Carriage of Flammable and Combustible Cargo</u>
- C. U.S. OSHA Standard <u>Flammable and Combustible Liquids 29 CFR 1910.106</u>
- D. U.K. "<u>Dangerous Substances and Explosive Atmospheres Regulations</u> 2002"
- E. Australian Standards AS 1940-2004. <u>The Storage and Handling of Flammable and Combustible Liquids</u>
- F. Attachment 15-1 Flammable and Combustible Liquid Classifications
- G. <u>Attachment 15-2</u> Flammable, Combustible, Oxidizer & Compressed Gas Inspection Sheet.



Attachment 15-1

FLAMMABLE AND COMBUSTIBLE LIQUID CLASSIFICATIONS

9.0	Flammable Liquid	Flash Point	Boiling Point
Class 1A Class 1B Class 1C		< 73° F	< 100° F
		< 73° F	> 100° F
		> 73° F < 100° F	
	Combustible Liquid		
Class 2 Class 3		> 100°F < 140°F	
		140° F	

Maximum Allowable Size of Containers and Portable Tanks

	Flai	mmable Liq	uids 🦟 🗼	Combustil	ole Liquids
Container Type		Class 1B	Class 1C	Class II	Class III
Glass or approved plastic	1 pt	1 qt	1 gal	1 gal	1 gal
Metal (other than DOT drums)	1 gal	5 gal	5 gal	5 gal	5 gal
Safety cans	2 gal	5 gal	5 gal	5 gal	5 gal
Metał drums (DOT specifications)	60	60	60	60	60
Approved portable tanks	660 gal	660 gal	660 gal	660 gal	660 gal

Maximum Storage in Buildings Outside of Storage Cabinet or Storage Room

Туре	Amount
Class 1A	25 gallons
Class 1B (containerized)	120 gallons
Class 1B (single portable tank)	660 gallons
Class 1C (Containerized)	120 gallons
Class 1C (single portable tank)	660 gallons
Class 2 (containerized)	120 gallons



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Health, Safety, and Environment

Attachment 15-2

FLAMMABLE, COMBUSTIBLE, OXIDIZER & COMPRESSED GAS INSPECTION CHECKLIST

Location inspected: Job No.:				
Date	Inspected: Name of Inspector:			
		Yes	No	N/A
anistyk) Tark	Storage Cabinets	. A. C. 1843.		\$ #0 X
1.	Flammable cabinets do not obstruct room exits.			
2.	No more than 60 gallons of flammable or 120 gallons of combustible liquid is stored in a cabinet.			
3.	No more than three cabinets are located in a storage area.			,
4.	Metal storage cabinets have self-closing doors.			
5.	Cabinets are labeled "FLAMMABLE-KEEP FIRE AWAY"			
wink q uep 8	Safety Cans			r we y Vikis
6.	Safety cans are constructed of stainless steel, Monel or tin.			·
7.	Safety cans have a flame arrestor and spring-loaded cap on both the filling and pouring spouts.			
	Drum & Drum Storage Areas	ing and a second	J. Arg. B	1447
8.	Drums are stored in a vertical position.			
9.	Bungs are closed when liquid is not being transferred.			
10.	Drums are shielded from the sun.			
11.	Funnels with installed flash arrestor are used when transferring flammable liquids into drums.			
12.	A minimum distance of 25 feet between a drum storage area and buildings is present.			
13.	A "NO SMOKING" sign is posted in the area.			
14.	An emergency spill kit is near the drum storage area.			
15.	A 20 lb. dry-chemical fire extinguisher is no less than 10 feet or more than 50 feet from the storage area.			
	Waste Cans			
16.	Combustible scrap, debris and waste materials (oily rags, etc.) are stored in covered metal cans.			
17.	Waste cans are removed from the work area daily.			
18.	Waste cans have spring-loaded self-closing lids.			

Storage Rooms Designed Specifically For Flammable Materials

Room construction meets NFPA fire-resistance requirements.

Rooms with automatic extinguishing systems have the following:

Noncombustible liquid-tight raised sills or ramps at least four inches in

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Health, Safety, and Environment

Attachment 15-2

FLAMMABLE, COMBUSTIBLE, OXIDIZER & COMPRESSED GAS INSPECTION CHECKLIST

		Yes	No	N/A
	height.			
	Flooring at least four inches below the surrounding floor, or an open grated trench that drains to a safe location.			
	Openings with approved self-closing fire doors.			
	Liquid-tight construction where the walls join the floors.			
	Shelving, racks, dunnage floor overlay and other interiors with one inch wood.			
21.	Rooms are ventilated by a gravity or mechanical exhaust system that:			
	Commences not more than 12 inches above the floor.			
	 Is designed to provide for a complete change of air within the room at least six times per hour. 			
	 Is controlled by a switch located outside the door, with ventilating equipment and any light fixtures operated form the same switch. 			
. 200.34	Flammable & Combustible Storage Areas Within Buildings			
22.	At least one portable fire extinguisher rated not less than 20-B is located outside of but not more than 10 feet from the door opening into any room used for the storage of more than 60 gallons of flammable or combustible liquids.			
23.	Buildings or rooms are locked when not occupied.			
24.	Exits, stairways or passageways are not used for storing flammables and combustibles.			
25.	No more than 25 gallons of Class IA or 60 gallons of Class IB, II or III liquids is located in a room outside of a flammable storage locker or flammable storeroom.			
26.	An isle at least three feet wide is maintained in storage areas.			
27.	No more than those amounts needed for one day's use are stored in buildings under construction.			
N. j	Outside Storage of Flammable and Combustible Liquids			
28.	At least one portable fire extinguisher having a rating of not less than 20-B is located not less than 25 feet or more than 75 feet from any outside flammable liquid storage area.			
29.	For containers not more than 60 gallons each, no more than 1,100 gallons in any one group are stored.			
30.	Groups of containers are separated by five-foot clearances.			
31.	Groups of containers are more than 50 feet from buildings.			
32.	Portable tanks (not exceeding 660 gallons in capacity) are provided with emergency venting devices as specified by NFPA 30.			
33.	Storage areas are free of accumulation of weeds, debris, and other combustible materials not necessary to the storage.			



Attachment 15-2

FLAMMABLE, COMBUSTIBLE, OXIDIZER & COMPRESSED GAS INSPECTION CHECKLIST

		Yes	No	N/A
P/60: 322 2. 32 321 3. 32 321	Storage Tanks			The state of the s
34.	Tanks have relief vents.			
35.	Tank vents are not close to open flames, stacks, heating apparatus, or any other source of ignition.			
36.	A dike or curb or other suitable means to prevent the spread of leakage from tanks.			
37.	Diked areas have a capacity equal in volume to at least that of the largest tank plus 10% of all other tanks in the enclosure.	1		
38.	Provisions to drain off accumulations of ground or rainwater or spills in diked areas.			
	Dispensing of Flammable and Combustible Liquids			N _j y,
39.	Dispensing outlets for above ground tanks with nationally listed automatic- closing valve, without a latch-open device.			
40.	Dispensing systems are electrically bonded and grounded.			
41.	Tanks, hoses and containers of five gallons or less in metallic contact while transferring flammable liquids.			
42.	Electrically bonded systems are used for transferring flammable liquids in containers in excess of five gallons.			
43.	Closed piping systems are used for drawing flammable liquids during transfer.			
44.	Flammables and combustibles are drawn from a container or portable tank by use of gravity or through a pump suing an approved self-closing valve.			
	Liquefied Petroleum Gas – Refueling		ing (Till 1997) Ali Jima Ti	
45.	Equipment is shut down during refueling operations.			
46.	Leather gloves and safety glasses are worn during refueling operations.			
47.	Smoking and hot work is prohibited during refueling.			
48.	Refueling occurs at least 25 feet from buildings.		:	
	Compressed Gases - Storage			
49.	Cylinders must be capped when regulators are removed.			
50.	Oxygen and fuel cylinders are stowed in designated well-ventilated areas.			
51.	Storage areas have temperatures less than 130 degrees.			
52.	Cylinders are stored upright and secured from falling over.			
53.	Cylinders are in segregated groups by gas type and not intermingled with other cylinders.			
54.	Oxygen cylinders are stored at least 20 feet away from flammables. (A fire resistive partition of at least one-hour fire resistance rating of at least five-foot height may also be used.)			
55.	Flammable or combustible materials are kept at least 20 feet away from stored cylinders.			



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Health, Safety, and Environment

Attachment 15-2

FLAMMABLE, COMBUSTIBLE, OXIDIZER & COMPRESSED GAS INSPECTION CHECKLIST

		Yes	No	N/A
56.	Gas cylinder valves are protected from snow and ice during winter months.			
57.	Oxygen cylinders are kept free from oil and grease.			
58.	Welding cylinders are securely fastened to ready-use racks.			
59.	Smoking or open flames are not permitted in areas where cylinders are stored.			
60.	Cylinder storage areas are posted with the following sing: "DANGER – NO SMOKING OR OPEN FLAME"			
61.	Cylinders are labeled with gas contents and warning statement.			
62.	Empty cylinders are segregated from full cylinders.			
Sign.	Oxidizers	Sa. II		ay tak
63.	Oxidizers are stored separately from flammables.			
64.	When oxidizers are shifted to a second container, the container is labeled with the appropriate warning labels.			
65.	Secondary containers are compatible with oxidizers.			
66.	Oxidizers are stored away from heat sources where the maximum temperature exceeds 100 degrees F.			
67.	Chromic acid, nitric acid, perchloric acid, potassium permanganate (all oxidizers) are stored separately from other corrosives and flammables.			

Issue Date: February 2001 Revision 4: October 2007

URS SAFETY MANAGEMENT STANDARD Hazardous Waste Operations

1. Applicability

This standard applies to all operations of URS Corporation and its subsidiary companies involving the investigation or remediation of sites impacted with hazardous wastes or hazardous materials including those associated with underground storage tanks.

Normally, investigation projects for real estate transactions conducted to confirm that a site is "clean" are not covered under this standard. If the Project Manager reasonably expects that there is the potential for a "clean" site to actually have some level of contamination, it should initially be treated as contaminated and subject to this standard. Reference related <u>Safety Management Standards</u> for such operations.

2. Purpose and Scope

The purpose of this standard is to minimize the risks to URS personnel and subcontractors while conducting hazardous waste field operations.

Investigation techniques included under this standard include, but are not limited to, hand auger, soil gas evaluation, groundwater monitoring, test pits, and all types of power drilling, including direct push. Remediation techniques included under this standard include, but are not limited to, excavation, groundwater treatment, soil gas treatment, containment, and landfarming.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site/project.

A Corporate, Regional, Country or Strategic Business Unit (SBU) Health, Safety and Environment (HSE) Manager must approve deviations from this procedure.

4. Requirements

The URS Safety Management System and Safety Management Standards were designed to help employees to identify, evaluate and control safety and health hazards and to provide for emergency response. Site/project hazards and scope of work dictate the specifics, which are covered in Facility Emergency Action Plans and Project Health and Safety Plans (HASPs).

A. Project Evaluation

Issue Date: February 2001 Revision 4: October 2007

URS SAFETY MANAGEMENT STANDARD Hazardous Waste Operations

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Assess the technical and field aspects of every hazardous waste site project to evaluate:

- 1. Risk of exposure to hazardous chemicals, with particular attention to suspected or known human carcinogens.
- 2. Personal protective equipment requirements.
- 3. Air monitoring requirements.
- 4. Emergency services requirements.
- 5. Hazards addressed by other URS <u>Safety Management Standards</u> (e.g. Confined Space Entry SMS 10).
- 6. Hazardous materials shipping and disposal responsibilities.
- 7. Other safety and health hazards associated with site operations.

B. Client/Contract Evaluation

- Review contract documents to determine whether the client has any special internal or regulatory requirements for hazardous waste site operations.
- 2. Implement client requirements in addition to those of this standard. Those requirements that are the most protective (e.g., most stringent) will be used.

C. Site-specific Health and Safety Plan

- 1. Prepare a site-specific Health and Safety Plan (HASP) for every project under this standard.
- HASPs must be written or approved by a URS Corporate, Regional, Country or Strategic Business Unit (SBU) Health, Safety and Environment (HSE) Manager or a safety professional specifically approved by the HSE Manager, and by the project manager.
- Evaluate client and agency requirements prior to preparing the HASP, particularly if the client or an agency will approve the HASP prior to implementation.
- 4. On a site/project specific basis staff conduct a hazard assessment and identify appropriate engineering controls, work practices, and

Issue Date: February 2001 Revision 4: October 2007

URS SAFETY MANAGEMENT STANDARD Hazardous Waste Operations

PPE requirements. This assessment and the mitigations/controls are documented in site/project specific HASPs that are normally provided to clients by the project manager for their review and approval prior to the initiation of field activities.

- 5. On a site/project specific basis qualified staff conduct a hazard assessment for potential physical and chemical exposures and identify monitoring equipment, frequency, action levels, and actions with approval of the project manager. These are incorporated into project/site specific HASPs which are normally reviewed and approved by our clients prior to the initiation of field activities. Guidance on monitoring is provided in <u>SMS 43</u> (Personal Monitoring/Industrial Hygiene).
- 6. On a site/project specific basis and based on the potential chemical exposures, and work activities, staff develop specific decontamination procedures that include instructions on materials, decontamination steps and location of decontamination zones with approval of the project manager. The purpose of these procedures will be to ensure personnel leaving contaminated areas are appropriately decontaminated and all equipment is disposed or decontaminated. This information is incorporated into site/project specific HASPs which are normally reviewed and approved by our clients prior to the initiation of field activities.
- 7. PPE selection, use and maintenance are presented in SMS 29 (Personal Protective Equipment). This information is documented on a site/project specific basis in the site/project HASP. Staff will remove any non-impermeable PPE clothing that becomes contaminated with hazardous substances in accordance with the decontamination procedures noted above. These instructions are reiterated in the emergency decontamination procedures in the HASPS.
- 8. On a site/project specific basis, if it is determined that regular showers, change rooms and sanitation facilities are necessary; these will be provided for employees.

D. Training

Verify that each assigned URS employee has completed required training.

URS SAFETY MANAGEMENT STANDARD Hazardous Waste Operations

- 1. 40-hours of initial training from an approved training provider, (24 hours of initial training for operations outside of North America).
- 2. 3-days of on-the-job training (one day is required for operations outside of the United States).
- 3. 8-hours of refresher training completed within 12 months of the initial or subsequent refresher training.
- 4. 8-hours of Site Safety Officer (Supervisor) training for directing the activities of any other URS employee or subcontractor.
- 5. Additional training for the Site Safety Officer as described below.

E. Site Safety Officer

- 1. Appoint a Site Safety Officer (SSO) with appropriate qualifications for the specific hazardous waste project.
- 2. Assure that the SSO for complex projects, such as those with complicated remediation activities, has no duties other than site safety and health.
- 3. Verify that the SSO has completed basic supervisor training, and has additional required training and experience as applicable:
 - a. Additional respiratory protection training is required for projects where supplied air respirators may be used.
 - b. Heavy equipment/construction safety.
 - c. Personal air monitoring.
- 4. The Site Safety Officer will monitor decontamination and other site activities for effectiveness.

F. Exposure Monitoring

Require that exposure monitoring is conducted in accordance with the HASP on all hazardous waste projects.

G. Project Equipment

 Provide all health and safety equipment as described by the project HASP.

URS SAFETY MANAGEMENT STANDARD Hazardous Waste Operations

2. Provide all personal protective equipment as described by the project HASP.

H. Medical Surveillance

Verify that each URS employee assigned to the project meets the minimum requirements of the URS Medical Surveillance Program (refer to SMS 024). This typically includes:

- 1. Baseline examination.
- 2. Annual examination.
- 3. Appropriate clearance for respirator use.
- I. Compliance Assurance

Attachment 68-3, Hazardous Waste Site Evaluation is a tool for use in determining the effectiveness and compliance of a waste site operation.

5. Documentation Summary

In the Project Safety File:

- A. Completed Health and Safety Plan.
- B. Completed and signed HASP approval form.
- C. Signed HASP acceptance form.
- D. Completed H&S field forms that are included in each HASP.
- E. Training and Medical Surveillance Clearance documentation for project personnel.

6. Resources

- A. U.S. OSHA <u>Hazardous Waste Operations</u>
- B. Attachment 68-3, Hazardous Waste Site Evaluation
- C. European Agency for Safety and Health at Work, Dangerous Substances http://europe.osha.eu.int/good_practice/risks/dangerous_substances/

SMS 017

Issue Date: February 2001 Revision 4: October 2007

URS SAFETY MANAGEMENT STANDARD Hazardous Waste Operations

- D. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities NIOSH 85-115
- E. USACE EM 385-1-1 <u>Hazardous Waste Operations and Emergency Response (HAZWOPER)</u>



HAZARDOUS WASTE OPERATIONS H&S AUDIT REPORT AND CHECKLIST

Attachment 17-1

Issue Date: Dec 2001 Revision 1: Sept 2004

Project Number:	Date of Audit:			
Project Office:	Project Manager:			
Project Location:	Auditor:			
Project Activities:				
Duration of project on site:				
Subcontractors:				
Site Conditions, Weather:				
Comments:				
ADMINISTRATIVE	L	Yes	No	N/A
-		Т		
Health and Safety Plans		-		
Has the HSP been reviewed by the Regional HSE Manager?				
Have the HSP Approval pages been signed?				
Have all the HSP Acceptance forms been filled out?				
Have Site Safety Briefing Forms been filled out?		-		
Have Incident Report Forms (as applicable) been filled out?				
Additional information:				
			į	
Site Control				
Site Safety Officer appointed?				
Site Safety Officer present?				
Site map available to personnel?				
Site security and control measures evident in the field?				
Communication systems (walkie-talkies, air horns) to alert persite evacuation?	rsonnel in event of			
Does at least one person on site at all times have current CPI training?	R and First Aid			
Route to the nearest comprehensive medical treatment facility personnel?	/ available to			
Site perimeter marked (existing fenceline, boundary markings appropriately with warning signs to alert nearby residents of the hazards?				

Emergency phone numbers conspicuously posted at site?



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Health, Safety, and Environment

HAZARDOUS WASTE OPERATIONS H&S AUDIT REPORT AND CHECKLIST

Attachment 17-1

		Yes	No	N/A
Additional information:				
Training Documentation for URS I	Personnel			
Documentation of initial health and safet	y training (24 or 40 hour)?			
Documentation of on-the-job-training?				
Documentation of 8 hour annual refresher	er training?	_		
Documentation of additional training rela and supervisors directly responsible for s hazardous waste operations?	ting to site operations for on-site managers supervision of personnel engaged in			
Documentation of training received in the HSP? (as applicable):	e following elements of the site specific			
Site control measures?	Chemical hazards?			
Decontamination procedures?	Physical hazards?			
Emergency response plan?	Location of MSDSs?			
Confined space entry procedures?	Location of emergency equipment?			
Spill containment?	Use, maintenance and storage of PPE	:		
Documentation of specialized training for hazards to ensure their safety when perf	r personnel who may be exposed to unique orming such operations?			
Documentation of appropriate training to indicated by an appropriate license or ce etc.)?	perform job function and responsibility as rtification (eg backhoe, forklift, crane,			
Documentation to certify personnel are pwear respiratory protection?	hysically able to wear a respirator if they			
Medical clearance forms for URS persor	nnel?			
Additional information:		-		
				!
Informational Programs			···	
	d and de sussaile d0			Γ
Daily site health and safety briefings held				
Health and Safety posters (where require				
Have accident reports been properly cor	·	~		
Does written inventory of chemicals mate				
Are MSDSs available for every chemical	listeu/useu (1



HAZARDOUS WASTE OPERATIONS H&S AUDIT REPORT AND CHECKLIST

Attachment 17-1

	Yes	No	N/A
Additional information:			
	<u> </u>		
WASTE DISPOSAL			
Proper disposal of PPE, decontamination materials?		_	
Proper disposal of spoils/waste water?		-	
EXPOSURE MONITORING			
Health and safety instrumentation available and in use per HSP?			
Air monitoring instrumentation maintenance and calibration logs available and current?			
Air monitoring performed every time a different operation is initiated?			
Air monitoring performed when personnel are working in an area with obvious liquid contamination?	1	-	
Air monitoring performed any time that new contaminants are encountered that differ from those initially encountered?			
Air monitoring performed any time new work begins on a different portion of the site?			
Air monitoring log available and current?			
Does monitoring log reflect excursions above action levels?			
Has personal sampling been performed?			
Have any exposure symptoms been reported?			
Additional information:			
HEAT STRESS MONITORING			
Has heat stress monitoring been implemented?			
Are work/rest schedules established/followed?			
Are pulse and oral temperature taken?			
Monitoring log available and current?			
Any heat stress incidents?			
Are personnel aware of symptoms/first aid?			
Are emergency medical treatment and first aid available to personnel?			



HAZARDOUS WASTE OPERATIONS H&S AUDIT REPORT AND CHECKLIST

Attachment 17-1

	Yes	No	N/A
Additional information:			
		i	
PERSONAL PROTECTIVE EQUIPMENT	<u> </u>		
Are engineering controls used on site?			
If no could they be used?			
If unique physical hazards are present on-site (e.g.: explosives, deep or rapidly moving water) is appropriate PPE being worn to address such hazards?			
Have employees been instructed in proper use of special PPE?			
Appropriate on-site personnel been fit-tested successfully for respirators?			
All PPE called for in HSP available?			
Is there sufficient PPE available for the personnel involved in the performance of site operations?			
Is PPE used in accordance with HSP			
Has PPE been upgraded or downgraded?			
Is the PPE in place adequate for the chemical and physical hazards on-site			
Is there a need to modify the PPE requirements?			
All personnel appropriately taped up?			
If ambient noise levels may be greater than or equal to 85 dBA, are earmuffs or ear plugs worn by personnel on site?			
Is footwear leather or rubber with steel toes and steel shanks?			
If there are overhead hazards on site, do personnel wear hard hats in those work areas?			
Additional information:			
			ļ
CONFINED SPACES		<u> </u>	
Does the site require confined space entry? (If yes, continue with this section)		<u> </u>	
Does the HSP contain a section on procedures for confined space entry?			
Is entry permit present and complete?			
Do personnel have documented confined space training?			
Additional information:			
·			



HAZARDOUS WASTE OPERATIONS H&S AUDIT REPORT AND CHECKLIST

Attachment 17-1

	Yes	No	N/A
DRUM HANDLING PROCEDURES	•		
Drums and containers used for the clean-up on site?		_	T
If yes, do the drums meet appropriate regulations for the wastes they contain?			
All drums and containers inspected for structural integrity before moving?			
Personnel warned of the potential hazards associated with the contents of drums or containers prior to movement?			
Are drums moved using appropriate mechanical devices to avoid injury?			
Is there a potential for major spill during transfer of drums or containers?			
If yes, is there a spill containment program in place to contain and isolate the entire volume of the spill?			
Drums of unknown content			
Is a detection system being used to estimate location and depth of drums and containers on-site prior to excavation activities?			
Are drums or containers being handled on site?			
If yes, is a fire extinguisher on site during any drum or container moving operation in the event of a fire?			
Does an instructional program for personnel detail procedures for drum or container opening operations?			
Are only required personnel present during drum or container openings and are other personnel at a safe distance from the operation?			
Additional information:	;		
DECONTAMINATION PROCEDURES			
Decontamination areas situated to minimize contamination potential of uncontaminated personnel or equipment?			
Site safety and health supervisor monitor decontamination procedures?			
Are HSP decontamination procedures observed?			
Do established equipment drop-off decontamination and protective clothing doffing procedures minimize personnel exposure?	:		
Are personnel, clothing and equipment decontaminated properly, prior to leaving a contaminated area?			
Protective clothing and equipment decontaminated, cleaned, laundered, maintained or replaced as needed to maintain effectiveness?			
Is proper order of PPE removal observed?			
Where decontamination procedures indicate a need for showers and changing rooms, are soap, hot and cold water, individual clean towels and separate storage facilities for street and work clothes available?			



HAZARDOUS WASTE OPERATIONS H&S AUDIT REPORT AND CHECKLIST

Attachment 17-1

	Yes	No	N/A
Are unauthorized personnel (e.g. administrative and support staff) denied access to decontamination areas, decontamination equipment and change rooms?			
Are washing facilities away from hazardous substances and adequate to permit personnel to remove hazardous substances from their bodies?			
Are decontamination solution(s), equipment and clothing properly marked and left on site or disposed of?			
Additional information:			
ů.	1		
DRILLING		·	
Have proper underground clearances been obtained?			
Have overhead utility clearances been considered?			
Flammable liquids in approved containers?			
Emergency rig shut off within reach of the operator?			<u> </u>
Appropriate fire shut off within reach of the operator?			
Drilling platform properly stabilized?			
Ropes and chains in good condition?			
Additional information:			
	l		
EXCAVATION		т——	
Have proper utility clearances been obtained?			
Has the on-site Competent Person been identified and is present?	<u> </u>		
Are daily trench inspections being conducted (or more frequently, as conditions warrant)?	L		
Support systems (piling, cribbing, and shoring) appropriate for the job?			<u> </u>
Is there suitable access by stairs, ladders, ramps, and hoists?			
Appropriate guard rails, fences, barricades and warning lights?			
Additional information:			
		<u></u>	
MISCELLANEOUS SAFETY PROCEDURES		,	,
If site work is anticipated in dimly lit areas, is additional lighting provided?			}



HAZARDOUS WASTE OPERATIONS H&S AUDIT REPORT AND CHECKLIST

Attachment 17-1

Issue Date: Dec 2001 Revision 1: Sept 2004

	Yes	No	N/A
Is potable water labeled as safe for drinking?			
Are non-potable water sources labeled as unfit for drinking, washing and cooking?			
If there are fewer than 20 people on site, is there a minimum of one toilet available?			
Is food handled in accordance with local food handling regulations?			
If temporary sleeping quarters are present are they heated, ventilated and lighted?			
If 'hot work' such as welding or cutting is occurring on site, the following questions apply:			
Appropriate combustible gas indicator air monitoring conducted?			
Hot Work Permit completed?			
Fire extinguishers present?		4	
Personnel wearing appropriate protective goggles and fire retardant clothing?			
If radiation is a concern on site, are engineering/administrative controls and/or PPE selection appropriate for the tasks at hand?			
Compressed gas cylinders in safe condition			
Electrical equipment intrinsically safe? (for potentially explosive atmospheres)			
Additional information:			
			}
OVERALL			
Any unsafe behavior observed?			
Any unsafe deviations from HSP?			
If yes, have they been properly documented and investigated?			
Additional information:			
	•		

Date	of	Report:
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Issued by:

Copied to:

Project Manager

Site Safety Officer

Regional HSE Manager

URS SAFETY MANAGEMENT STANDARD Heat Stress

1. Applicability

This procedure applies to URS field projects where ambient (not adjusted) temperatures exceed 70°F (21°C) for personnel wearing chemical protective clothing, including Tyvek coveralls, and 90°F (32°C) for personnel wearing normal work clothes.

2. Purpose and Scope

The purpose of this procedure is to protect project personnel from the effects of heat related illnesses.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

- A. Monitor ambient temperatures and conduct heat stress monitoring when threshold temperatures (see Section 1) are reached.
- B. Conduct initial monitoring to determine first rest break.
 - 1. Measure the air temperature with a standard thermometer with the bulb shielded from radiant heat; this yields T (actual).
 - 2. Estimate the fraction of sunshine by judging what percent time the sun is not shielded by clouds that are thick enough to produce a shadow, as follows:
 - a. 100 percent sunshine (e.g., no cloud cover) = 1.0
 - b. 50 percent sunshine (e.g., 50 percent cloud cover) = 0.5
 - c. 0 percent sunshine (e.g., full cloud cover) = 0.0
 - 3. Plug these variables into the following equation to determine the adjusted temperature:

T (adjusted) = T (actual) + (13 x fraction sunshine)

C. Body Temperature Monitoring

URS SAFETY MANAGEMENT STANDARD Heat Stress

- Monitor oral body temperature to determine if employees are adequately dissipating heat buildup. Ear probe thermometers which are adjusted to oral temperature are convenient and the preferred method of measurement. Determine work/rest regimen as follows:
 - a. Measure oral body temperature at the end of the work period.
 - b. If temperature exceeds 99.6 °F (37.5 °C), shorten the following work period by 1/3 without changing the rest period.
 - c. If temperature still exceeds 99.6 °F (37.5 °C), shorten the following work period by 1/3.
 - d. Do not allow a worker to wear impermeable PPE when his/her oral temperature exceeds 100.6 °F (38.1 °C).
- 2. Oral body temperatures are to be obtained prior to the employee drinking water or other fluids.

D. Pulse Rate Monitoring

- 1. Take the radial (wrist) pulse as early as possible in the rest period.
 - a. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third.
 - b. If the heart rate still exceeds 110 beats per minute at the next rest cycle, shorten the following work cycle by an additional one-third.
- E. Record monitoring results on Heat Stress Monitoring Form (<u>Attachment</u> 18-2).
- F. Investigate the use of auxiliary cooling devices in extreme heat conditions.
- G. Conduct briefings for employees regarding health hazards and control measures associated with heat stress whenever conditions require the implementation of heat stress monitoring. Review the information provided in Attachment 18-3.

URS SAFETY MANAGEMENT STANDARD Heat Stress

- H. Provide water and electrolyte replacement drinks fluids as described in <u>Attachment 18-3</u>.
- I. Allow employees who are not accustomed to working in hot environments appropriate time for acclimatization (see <u>Attachment 18-3</u>).
- J. Provide break areas as described in Attachment 18-3.

5. Documentation Summary

File these records in the Project Safety File.

- A. Heat Stress Monitoring Forms.
- B. Employee Safety Briefing Verification Forms.

6. Resources

- A. NIOSH "Working in Hot Environments"
- B. AFL-CIO Building Trades Division "Heat Stress in Construction"
- C. Attachment 18-1 Initial Work Monitoring Cycles
- D. Attachment 18-2 Heat Stress Monitoring Record
- E. Attachment 18-3 -Informational Supplement



Attachment 18-1

INITIAL WORK / MONITORING CYCLES

Adjusted Temperature	Normal Work Clothes	Protective Clothing
90 F (32.2 C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5 F - 90 F (30.8 - 32.2 C)	After each 60 minutes of work	After each 30 minutes of work
82.5 F – 87.5 F (28.1 C – 30.8 C)	After each 90 minutes of work	After each 60 minutes of work
77.5 F – 82.5 F (25.3 C – 28.1 C)	After each 120 minutes of work	After each 90 minutes of work
72.5 F – 77.5 F (22.5 C – 25.3 C)	After each 150 minutes of work	After each 120 minutes of work

URS Corporation

URS Corporation Health & Safety Program EMPLOYEE HEAT STRESS EXPOSURE MONITORING RECORD

DATE:	SAFETY REPRESENTATIVE:							
WORKER'S NAME:	SUBCONTRACTOR:							
WORK ACTIVITY:		<u></u>						
Time (24 hour)	Oral Temp (°F)	Pulse (BPM)	Comments					
DATE:	SAFETYI	REPRESENTATIVE:						
	OAILIII		BCONTRACTOR:					
Time (24 hour)	Oral Temp (°F)	Pulse (BPM)	Comments					
DATE:	SAFETY I	REPRESENTATIVE:						
WORKER'S NAME:		SUE	BCONTRACTOR:					
WORK ACTIVITY:								
Time (24 hour)	Oral Temp (°F)	Pulse (BPM)	Comments.					
	· · · · · · · · · · · · · · · · · · ·							



Health, Safety, and Environment HEAT STRESS INFORMATIONAL SUPPLEMENT

Attachment 18-3

Revision 1: March 2005

HEAT RASH

Heat rash (prickly heat) may result from continuous exposure to heat or humid air. It appears as red papules (elevated skin lesion), usually in areas where the clothing is restrictive, and gives rise to a prickly sensation, particularly as sweating increases. It occurs in skin that is persistently wetted by un-evaporated sweat. The papules may become infected unless treated.

First Aid for Heat Rash - To prevent heat rash, shower after work, dry off thoroughly, and put on clean, dry underwear and clothes. Try to stay in a cool place after work. If, in spite of this, you develop heat rash, see your physician.

HEAT CRAMPS

Heavy sweating with inadequate electrolyte replacement causes heat cramps. Signs and symptoms include:

Muscle spasms.

Pain in the hands, feet and abdomen.

First Aid for Heat Cramps - Leave the work area, and rest in a cool, shaded place. Drink one or two glasses of electrolyte replacement drink, and try to gently massage the cramped muscle. Once the spasms disappear, you may return to work. Taking adequate breaks and drinking electrolyte replacement drink should prevent the cramps from returning.

HEAT EXHAUSTION

Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

Pale, cool, moist skin.

Heavy sweating.

Dizziness.

Nausea.

Fainting.

The key here is that the victim is still sweating, so the cooling system is still working; it's just under severe stress. The body core temperature may be elevated. It is important to



Health, Safety, and Environment HEAT STRESS INFORMATIONAL SUPPLEMENT

Attachment 18-3

Revision 1: March 2005

recognize and treat these symptoms as soon as possible, as the transition from heat exhaustion to the very hazardous heat stroke can be quite rapid.

First Aid for Heat Exhaustion - Leave the work area immediately. Go through decon and remove all chemical protective clothing. Rest in a cool, shaded place and open your clothing to allow air circulation; lay flat except when taking fluids. Drink plenty of cooled electrolyte replacement drinks. Your work is over for the day; do not attempt to return. Medical assistance in severe cases may be warranted.

HEAT STROKE

7.3

Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occurs. Competent medical help must be obtained. Signs and symptoms are:

Red, hot, usually dry skin.

Lack of or reduced perspiration (lack of perspiration may be masked for those wearing chemical protective clothing since perspiration from earlier in the day will be present).

Nausea.

Dizziness and confusion.

Strong, rapid pulse.

Coma.

First Aid for Heat Stroke - THIS IS A MEDICAL EMERGENCY! SUMMON MEDICAL ASSISTANCE IMMEDIATELY! Remove the victim from the work area, perform a gross decon, and remove all PPE. Have the victim lie down in a cool, shady area. Attempt to bring the victim's temperature down by increasing air movement (electric fan) or placing wetted sheets or towels on them. Place an ice bag on the victim's head. The victim must not be sent home or left unattended without a physician's specific order.

HEAT STRESS PREVENTION

The best approach to avoiding heat-related illness is through preventative heat stress management. The site manager and site safety officer are responsible for implementing this program.

Rest areas - A relatively cool, shaded area must be provided for breaks when ambient temperatures exceed 70 °F and workers are wearing chemical protective clothing (including uncoated Tyvek), or if temperatures exceed 90 °F and workers are wearing "Level D"



Health, Safety, and Environment HEAT STRESS INFORMATIONAL SUPPLEMENT

Attachment 18-3

Revision 1: March 2005

coveralls or work clothes. A car or van is an oven, not a rest area. For hazardous waste sites, the rest area should be located in the support zone adjacent to the contamination reduction zone, situated so that part of it is in the decon area so workers can take breaks without going through full decon. If shade is not available, build some. Use a plastic "dining canopy", which can be obtained at sporting goods stores. This same type of canopy can be set up to shade personnel performing various types of work in hot weather.

Liquids - Encourage employees to drink plenty of cool plain water and electrolyte replacement drinks. Supplementing water with cool electrolyte replacement drinks, such as Gatorade, Squench or Quik-kick (drink), is helpful to employees who tend to sweat a lot. Do not use "community cups"; use paper cups. Have workers drink 16 ounces of drink before beginning work, such as in the morning and after lunch. At each break, workers should drink 8 to 16 ounces. Don't wait until you are thirsty to drink.

Discourage the use of alcohol during non-working hours, and discourage the intake of coffee during work hours, as these make heat stress control more difficult.

Acclimatization - This is the process by which your body "gets used to" hot work environments. This is achieved by slowly increasing workloads. Start at 50 percent capacity on day one, and increase by 10 percent per day; on day six, you'll be at 100 percent. You don't lose acclimatization over a weekend, but it'll start to decrease after three to four days. If you don't do hot work for a week, it is gone. You don't have to do full shift hot work to achieve or retain acclimatization; a minimum of 100 minutes of continuous hot work exposure per day is adequate.

Auxiliary Cooling - Auxiliary cooling is usually obtained by providing workers with a specially-designed vest, which is worn under the protective clothing, but over any underclothing. These vests typically provide cooling via one of two methods: the use of ice or other frozen media, or the use of a vortex cooler. Each method has its advantages and disadvantages.

The frozen media vest requires a means for freezing the media, and the media (usually water or "blue ice") will melt, requiring replacement.

The vortex cooler tends to cool more uniformly. Instead of frozen media, this vest uses the expansion of compressed air to cool the wearer. The drawback is the compressed air requirement, but this is negated when the wearer is already using an airline respirator supplied by a compressor. A vortex cooler should not be supplied from air cylinders, as this will draw down the cylinders rapidly.

Auxiliary cooling should be considered when the following conditions exist:

Ambient temperature over 80 °F

Workers are wearing impermeable garments (i.e., Tyvek, Saranex, Chemrel, etc.)

It is desirable to have long work shifts with minimum interruption

1. Applicability

This procedure applies to URS field projects where heavy equipment is in operation.

2. Purpose and Scope

The purpose of this procedure is to require that heavy equipment is operated in a safe manner, that the equipment is properly maintained and that ground personnel are protected.

3. Implementation

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Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Authorized Operators

- 1. Evaluate operators through documentable experience (resume) and a practical evaluation of skills.
- 2. Allow only qualified operators to operate equipment.
- 3. Prohibit equipment from being operated by any personnel who have not been specifically authorized to operate it.
- 4. Maintain a list of operators for the project and the specific equipment that they are authorized to operate.
- 5. Require operators to use seat belts at all times in all equipment and trucks.
- 6. Prohibit personnel other than the operator from riding in or on the equipment unless additional seating (with seat belts) is provided by the manufacturer.
- 7. Operators shall maintain three points of contact whenever entering and exiting a piece of equipment.
- 8. Brief operators on the following rules of operation:
 - a. Operators are in control of their work area.

- b. Equipment will be operated in a safe manner and within the constraints of the manufacturer's Operation Manual.
- c. Operators will stop work whenever unauthorized ground personnel or equipment enter their work area and only resume work when the area has been cleared.

B. Ground Personnel

- 1. Require that ground personnel on the site have received training and comply with the following rules of engagement:
 - a. All ground personnel must wear high visibility protective vests when in work areas with any operating equipment.
 - b. Ground personnel will stay outside of the swing zone or work area of any operating equipment.
 - c. Ground personnel may only enter the swing or work area of any operating equipment when:
 - 1. They have attracted the operator's attention and made eye contact.
 - 2. The operator has idled the equipment down and grounded all extensions.
 - 3. The operator gives the ground personnel permission to approach.
 - d. Ground personnel shall never walk or position themselves between any fixed object and running equipment or between two running pieces of equipment.

C. Equipment

- 1. Maintain operations manuals at the site for each piece of equipment that is present on the site and in use.
- 2. Require that operators are familiar with the manual for the equipment and operate the equipment within the parameters of the manual.

- Require that all equipment is provided with roll-over protection systems (ROPS). Tracked excavators are exempt from ROPS requirements but must have a cab which provides protection from overhead hazards
- 4. Verify that seatbelts are present and functional in all equipment.
- 5. Prohibit the use of equipment which has cab glass which is cracked, broken or missing.
- Require that backup alarms are functional on all trucks and equipment. Tracked excavators must have bidirectional alarms or the operator must be provided with a spotter whenever tracking in either direction.
- 7. Require all extensions such as buckets, blades, forks, etc. to be grounded when not in use.
- 8. Require brakes to be set and wheels chocked (when applicable) when not in use.

D. Inspection and Maintenance

- 1. Require daily inspections of equipment by operators using Attachment 19-1.
- Prohibit use of equipment deemed to be unsafe as a result of daily inspection until required repairs or maintenance have been completed.
- 3. Conduct maintenance as prescribed by the manufacturer in the Operations Manuals for each piece of equipment.
- 4. During maintenance/repair, require that:
 - a. Motors are turned off.
 - b. All extensions are grounded or securely blocked.
 - c. Controls are in a neutral position.
 - d. Brakes are set.

5. Documentation Summary

File the following documents in the Project Health and Safety File.

- A. List of authorized operators.
- B. Operator qualifications.
- C. Daily Equipment Inspection Logs.
- D. Site briefing documentation for operator rules and ground personnel "rules of engagement".

6. Resources

- A. U.S. OSHA Standard <u>Motorized Vehicles and Mechanized Equipment</u> 29 CFR 1926, Subpart O
- B. National Association of Demolition Contractors Safety Manual
- C. Queensland Workplace Health and Safety Competency Standard for Users & Operators of Industrial Equipment
- D. Attachment 19-1 Equipment Inspection Form

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies for employees assigned to work environments where there is a potential for exposure to chemical, biological, and/or physical hazards. Individuals will be selected for medical screening based on regulatory standards, project health and safety plan assessments, the expected use of personal protective equipment, and client contract requirements.

2. Purpose and Scope

The overall goal of this program is to prevent occupational illness and injury by early identification of exposure-related health effects before they result in disease. Medical examinations will be performed in order to determine if employees are capable of safely performing assigned tasks, to verify protective equipment and controls are effectively providing protection, and to comply with governmental regulations. Included are provisions for emergency medical consultation and treatment.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, Country, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure.

Program Administration – The Occupational Health Manager (OHM) is responsible for development and administration of this program in coordination with the URS Medical Service Provider (MSP). The OHM will maintain current injury and illness data and participate with Corporate, Regional, Country, or Strategic Business Unit (SBU) HSE Managers in evaluation of this program. The MSP will provide board certified occupational medicine oversight for the program and will approve medical surveillance protocols.

Locations in the United States and Canada will follow all requirements of this program.

International locations will follow sections B.1, 2, 3, 5, 6, 7, and 8; G.3; and H.1 of this program.

4. Requirements

A. Selection of program participants.

- 1. The Medical Surveillance Evaluation (MSE) form <u>SMS 24-2</u> provides the primary guidance for determining whether medical screening is required for an employee and the frequency of periodic exams. The MSE is to be completed by the employee and their supervisor at time of hire for any employee who may work outside an office environment and is to be reviewed for accuracy at each annual performance review. Other reviews are required whenever there is a change in job tasks.
- 2. Additional site/project specific biological monitoring or toxicological screening may be required in addition to this program's core exam schedule. These medical tests will be specified by the project-specific health and safety plan and will be authorized by the MSP on the exam appointment protocol. Note: See Section D.2 if employee will have an initial assignment at a HAZWOPER site.
- B. Types of medical screening and surveillance exams
 - A baseline or pre-assignment baseline exam will be conducted prior to the start of work assignments requiring medical surveillance.
 - 2. Periodic exam schedules are established by the MSP using the following criteria:
 - a. Employees performing the following types of work will receive annual exams: construction activities in the exclusion zone of HAZWOPER sites, field work activities in the exclusion zone of HAZWOPER sites for 30 or more days per year, or projects involving exposure to OSHA-regulated materials at or above established action levels.
 - b. Employees performing the following types of work will receive biennial exams: field work activities at HAZWOPER sites less than 30 days per year; waste disposal activities; non-HAZWOPER environmental sampling; chemistry laboratory, pilot plant projects, or bench scale operations for 30 or more days per year.
 - 3. Employees currently participating in an examination program will receive exit exams when they leave their work assignment as identified in the Exit Exam Determination <u>SMS 24-6</u>. In the event an employee declines the exit exam, the employee will be

requested to sign a Waiver of Exit Medical Surveillance Exam - SMS 24-7.

- 4. Department of Transportation (DOT) exams will be conducted biennially when an employee is assigned to drive a vehicle with a gross weight rating of more than 10,000 pounds or when driving a placarded vehicle of any size used to transport hazardous chemicals. DOT exam certification can be added to a routine baseline or periodic exam protocol when scheduling with the MSP.
- 5. When noise levels in the employee's work environment equal or exceed an 8-hour time-weighted average of 85 decibels as measured on the A-scale (dBA), annual audiograms will be performed. For employees involved in construction activities or management of construction, enrollment in this program will be required if more than 50% of their time is spent in an active construction area.
- 6. Individual radiation dose monitoring will be conducted as required by the site-specific health and safety plan with approval by a Radiation Safety Officer. Personal dosimetry (film badges) is typically required; however, depending on the specific radiation hazard, additional excretory monitoring or thyroid scans may be required.
- 7. In order to determine an employee's ability to wear a respirator, a medical evaluation will be performed before an employee is fit tested or assigned to wear a respirator.
- 8. Employees assigned to work environments with airborne concentrations of asbestos fibers at or above the established action level will receive asbestos-specific baseline and annual exams. Exit exams will be performed if an exam has not been performed within the past 6 month period or if an employee has medical complaints related to asbestos exposure.
- 9. Blood sampling and monitoring will be conducted every 6 months until 2 consecutive blood samples/analysis are acceptable. An employee with elevated blood levels should be temporarily removed. Sampling and monitoring will be performed at least monthly during the removal period. Employees will be notified within 5 days when levels are not acceptable. Medical Removal Protection benefits apply in this situation.

C. Exam protocols

- 1. The Medical Screening & Surveillance Exam Protocol <u>SMS 24-3</u> identifies the medical exam components of this program.
- 2. Evaluation will be confidential, during normal hours, and employees may discuss the results with the MSP.

D. Scheduling of exams

- The Office or Project Manager, usually with assistance of the local HSE Representative, is responsible for contacting the MSP when baseline, exit, and project specific exams are required. The MSP maintains an employee scheduling database for tracking periodic exams and will contact the employee for scheduling the month their exam is due. These steps are detailed in the Medical Surveillance Exam Process – SMS 24-4.
- 3. Employees hired with an initial assignment to work at a HAZWOPER site whose work duties require passing a physical exam or who have an essential job function of wearing a respirator, will receive a job offer contingent upon passing a pre-assignment baseline exam. See HAZWOPER & Respirator Pre-assignment Baseline Exam Process SMS 24-5.
- 4. In the event of an urgent business need, a temporary clearance to begin work the day of the exam may be requested at the time a baseline exam is scheduled through the MSP. The temporary clearance will be issued by the local physician and will be good for up to 14 days or until the MSP physician's final clearance is received, whichever comes first.
- If an exam becomes due during an employee's pregnancy, it is advised to defer the exam until after delivery and the employee returns to work from family/medical leave status.

E. Exam Follow Up

 Following each exam, the MSP will issue a physician's written opinion (Health Status Medical Report) to the local HSE Representative which will include any medical restrictions and address the employee's ability to use personal protective equipment. See Exam Follow Up Procedures - SMS 24-8.

- 2. The MSP will mail the exam invoice to the Local Office HSE Representative who will approve the charge and forward the invoice to the accounts payable department for payment. (Medical exams that are part of this program are provided to URS employees at no cost to the employee).
- 3. The MSP will mail a confidential letter detailing the results of the exam to the employee at their home address within 30 days of the exam date.

F. Emergency Medical Care

- 1. Pre-planning is essential to a prompt and proper response to a medical emergency. Site-specific emergency procedures will be provided in the site Health & Safety Plan. Suggested pre-planning actions are provided in <u>SMS 065</u> (Injury Case Management). See Field First Aid Kit Supply List for recommended supplies. The contents of the first aid kit shall be checked prior to being sent out to each site/project and periodically thereafter to ensure the expended items are replaced.
- 2. A MSP occupational physician can be reached 24 hours a day for phone consultation at WorkCare™ (1-800-455-6155).
- A workers' compensation claim should be filed by URS
 Occupational Health Nurses with Sedgwick CMS(1-866-566-1915)
 for an injured employee who receives professional medical care or
 who is disabled from working beyond the initial date of injury.
- 5. In order to comply with OSHA reporting regulations, immediately notify the OHM or the applicable Corporate, Regional, Country, or Strategic Business Unit (SBU) HSE Manager if there is a work-related hospitalization or death.

G. Medical Records

- Medical records are maintained and preserved in confidential, locked files in the custody of the MSP for at least the duration of employment plus 30 years. Only information regarding the employee's ability to perform the job assignment will be provided to company representatives.
- 2. Upon request, each employee (or designated representative) will have access to the employee's medical record. Prior to the release

of health information to the employee (or designated representative), a specific written consent must be signed by the employee.

3. International records (excluding the United States and Canada) will be maintained in country at the local clinic.

H. Program evaluation

- The OHM and Corporate, Regional, Country, or Strategic Business Unit (SBU) HSE Managers will evaluate this program annually and as needed. Issues to review include program efficacy and efficiency, employee satisfaction, and cost effectiveness.
- 2. The MSP will prepare an Annual Medical Trending Report specifying the number and types of exams performed and anonymous statistical exam results in group data format.
- Each employee is mailed a Post-Exam Evaluation by the MSP.
 Employee feedback regarding the clinic, medical staff, and exam procedures are reviewed and corrective actions are identified and acted upon as needed.

5. Documentation Summary

The Local Office HSE Representative will file the Medical Surveillance Evaluation and the Health Status Medical Report in the site health & safety records.

6. Resources

- A. U.S. OSHA Technical Links Medical Screening/Surveillance
- B. <u>U.S. OSHA Publication 3162</u> (1999) Screening and Surveillance: A Guide to OSHA Standards
- C. Attachment 24-1 <u>WorkCare Medical History Questionnaire</u>
- D. Attachment 24-2 Medical Surveillance Evaluation
- E. Attachment 24-3 Medical Screening & Surveillance Exam Protocol
- F. Attachment 24-4 <u>Medical Surveillance Exam Process</u>
- G. Attachment 24-5 <u>HAZWOPER/Respirator Preassignment Baseline</u>
 Exam Process

H.	Attachment	24-6	Exit Exam Determination
l.	Attachment	24-7	Waiver of Exit Medical Surveillance Exam
J.	Attachment	24-8	Exam Follow Up Procedures
K.	Attachment	24-9	Field First Aid Kit Supply List
L.	SMS 8	Asbe	stos Survey and Oversight Operations
M.	SMS 17	<u>Haza</u>	rdous Waste Operations
N.	SMS 42	Resp	iratory Protection
0.	SMS 65	<u>Injury</u>	Case Management

Medical History Questionnaire Company Name: □ Baseline □ Annual/Biennial □ Exit □ Other Date:



Medical History Questionnaire

The exam will be at: Please see Appointment Protocol.

- Please have your Supervisor or Health & Safety Professional complete the Job Profile on the inside flap of this page if you do not know the responses.
- See your Health & Safety Professional for directions to the clinic. Please bring the completed exam packet and your Authorization.
- Do not eat for 8 hours prior to exam.
 (Water and unsweetened juice or black decaffeinated coffee are allowed)
 (Dry toast if you have an afternoon appointment)
- Avoid all alcohol consumption for 24 hours prior to the exam.
- Avoid loud noise exposure for 14 to 16 hours before the exam.
- If you wear contact lenses, please do not insert them on the day of the exam. Bring a pair of glasses.
- If you use hearing aids, please bring them to the clinic.
- If you have questions, do not read or understand please contact (800) 455-6155.
- The cost of this exam will be borne by your employer. It is important to be on time for your appointment. If you cannot attend your appointment, call (800) 455-6155 to cancel, or your employer may be charged.

Please answer all the questions in this booklet.

Occupational Medicine • Environmental Health • Toxicology

1-(800) 455-6155

I			INSTRUCT	TIONS				
			r this questionnaire dur identiality, your employ					
and your emp	oloyer mu	st tell you how to o	deliver or send this que	stionnaire to the l	nealthcare professiona			
Has your em	ployer tolo	d you how to conta	act the healthcare profe	ssional who will r	eview this questionna	Yes No ire? □ □		
information w for care provi	ill be used ded by a p	to determine if yo personal physiciar	nation about your health u can safely perform the n. Results of the exam	e duties of your jo	 b. This exam is not inte 	ended to substitute		
examination a	•	ontidential. e following inform	ation:					
				E N				
	Last N	lame:		_ First Name:				
	Home	mailing address:						
	(city)			(state)		(zip)		
	Socia	I Security Number	•	Date o	f Birth:	Age:		
	Sex [] M	ale [] Female	Position	Site Location		Date Employed		
	Home /	Phone	Work Phone		Emergency Contact/	Phone #		
	questi What i	onnaire (include a s the best time to	er at which you can be rea code:) () reach you? From:	AM/PM T	-	u who reviews this		
2.	I hereb subsid examir Job Du I furthe	y authorize WORK iaries medical infonations or medical ity consistent with rauthorize the exaction related to my	authorize WORKCARE to release of Medical Records: authorize WORKCARE to release in confidence to					
	Signati	ure:			Da	ite:		
			Job Pr	ofile				
		THI	S SECTION IS TO		ΓED			
If you have qu	uestions a	bout the job, these	e need to be discussed	with the employe	er.			
JOB DUTY /	TITLE	(Example: Driller,	job duty (present or pro Water Treatment, Grou cientist, Lab Tech, Heav	ınd Water Sampli	ng, Engineer,	/orker, etc.)		
WORK SCHE	DULE	%	5 Field % O	office	% Travel			

Are ther	CAL REQUIREMENTS e any specific physical demands of the job that ar lease specify:	re important? (e:	xample: lifti	ng, ca	rrying)	Yes □	No
PROTE	CTIVE EQUIPMENT					Yes	No
ls cleara	ance for the use of respiratory protective equipme	nt needed?					
Escape	only (no rescue) Emergency rescue or	nly 🗆					
ls there in the sa	specific safety equipment (beyond hard hat, glove of the performance on the job? If yes please specify:	es, boots, and a	ppropriate (clothir	ng) that are used	Yes	No
1.	THIS EMPLOYEE USES THE FOLLOWING T	YPES OF RESF	PIRATORY	PROT	ECTIVE EQUIPA	//ENT:	4.7
1		DURATION	FREQUEN	NCY	TEMPERATURE EXTREMES	HUMIDIT	Y
	HALF FACE PIECE AIR PURIFYING RESPIRATOR						
	FULL FACE PIECE AIR PUIRFYING RESPIRATOR						
	POWERED AIR PURIFYING REPIRATOR						
	SELF-CONTAINED BREATHING APPARATUS						
	AIR LINE RESPIRATOR					 	
Is it po	A, fully encapsulated suit, chemical resistant glove pssible that this individual will be required to wear A, chemical resistant clothing, chemical resistant options of the control of	Level B protecti		me?			
Will yo Will yo	ou be working under hot conditions (temperatures ou be working under humid conditions? ou be working at high altitudes? ribe the work you'll be doing while you're using yo			No			
	ribe any special or hazardous conditions you migh example, confined spaces, life-threatening gases)						
a. L b. M Exam at trur c. H Exam shove	5 ', ,	es	Host; working (about 50 (ator(s) that	Hoad (all ow lor on a l lbs.)	oout 35 lbs) nghrs per solutions oading dock; affect the safety	rs per shift	
	pere any substances which you can not work with						

737

12

F " 7

1-1

1 -:

 $f^{i}=1$

f ---

REVIEW OF SYSTEMS

ANSWER YES IF YOU CURRENTLY HAVE THE SYMPTOM OR HAVE HAD SIGNIFICANTLY IN THE PAST

		YES	NO	DATE
1,	A. Fever	1		
	B. Chills			
	C. Weight Loss			
	D. Loss of energy/fatigue			
2.	A. Poor Vision	 		
	B. Color Blindness	 		
	C. Double vision	+		
	D. Injury to eye			
	E. Cataract	+	_	
	F. Glaucoma			
	G. Do you wear glasses or contacts?	+		
	A. Ear Infection			
3.				
	B. Mastoid surgery			 -
	C. Loss of hearing			
	D. Sore throat			<u> </u>
	E. Frequent hoarseness			
	F. Dental problems			
4.	A. Allergies			ļ
	B. Sinus trouble			
	C. Hay fever			
5.	A. Tuberculosis			
	B. Asthma & breathing difficulties			
	C. Lung collapse			
	D. Pneumonia			
	E. Shortness of breath			
	F. Persistent or severe colds			
	G. Persistent or severe coughs			
	H. Chest surgery			
	I. Wheezing			
	J. Emphysema			-
	K. Bronchitis		 	
	A. High blood pressure			
6.	B. Heart murmur			
				-
	C. Enlarged heart			
	D. Heart disease/failure			
	E. Rheumatic fever			<u> </u>
	F. Heart palpitations			ļ
	G. Irregular heart beat			
	H. Heart attack			
	I. Chest pain			
7.	A. Varicose veins			
	B. Stroke_			
	C. Leg ulcers			
	D. Swelling of ankles			
	E. Leg pain on walking			
8.	A. Anemia			
	B. Leukemia			
	C. Sickle Cell Disease			1
	D. Other blood disease			
 9.	A. Diabetes			_
-•	B. Thyroid problems			
	C. Cancer or tumors			-
	D. Heart related illness		<u> </u>	-
	A. Rash/dermatitis		-	
10			<u> </u>	
10.	ID D to a second			i .
10.	B. Bruise easily			
10.	C. Psoriasis			
10.				

<u> </u>			YES	NO	DATE
11.		A. Headaches			
, , , ,		B. Head injury			
		C. Neck injury			
12.		A. Birth defect			
		B. Frequent backaches			
		C. Back surgery			
		D. Disc disease			
		E. Back injury or strain	-		
		F. Back x-rays			
		G. Chiropractic treatments			
		H. Arthritis/Rheumatism			
		I. Knee problems			
		J. Swollen joints			
		K. Amputation			
ĺ		L. Broken Bones			
		Type:			
		M. Dislocations			
ł		N. Carpal Tunnel Syndrome	-		
		O. Repetitive Strain Extremities			
13.		A. Ulcers	-	-	
,		B. Colitis	 		
		C. Diarrhea (frequent)	-		
		D. Stomach problems	 		
		E. Vomiting			
		F. Bloody bowel movements			
		G. Hepatitis/Abnormal liver enzymes			
		H. Cirrhosis			
}		I. Yellow Jaundice	_		
ĺ		J. Galibladder trouble			
14.		A. Epilepsy/seizures			
}		B. Fainting spells	-		
		C. Loss of consciousness			
		D. Dizziness or vertigo			
		E. Frequent exhaustion			
		F. Trouble with nerves			
		G. Frequent worry/depression	 		
15.		A. Kidney trouble/stones			
,		B. Bladder trouble			<u> </u>
		C. Kidney/bladder surgery			
		D. Blood in urine			
		E. Difficulty urinating			
16.		A. Venereal disease			
		B. Infertility/difficulty conceiving			
		C. Children with birth defects			
17.		A. Irregular period/painful menstruation			
		B. Hysterectomy			
		C. Are you pregnant?			
		D. Have you difficulty becoming			
	<u>•</u>	pregnant?			
	29	E. Date of last menstrual period			
	Female	F. Date of past pelvic/pap smear			
	ч.	G. Date of last mammogram			
		H. Breast lumps			
		I. Breast discharge			
		J. Repeated miscarriages			
18.		A. Inability to have an erection			
	Male	B. Discharge or bleeding from the penis	-		
	<u>a</u>				
	≥	C. Abnormal testicular self examination	 		
		D. Prostate problems			<u> </u>

L. LUZGINA/AUTO	D. Prostate problems
Describe fully any "Yes" responses by number:	
Are you currently unable to perform any type of activity? Yes 🗌	No ☐ List:

IV			SOC	AL	HIS'	TORY					
1 Do you now	or in the past	t month or	noke cigarettes?	YES	NO		IONIC 7 A	CHOOSE	THE ANO	WED	
-	•		•			FOR QUEST WHICH BEST			: THE ANS	WER	
2. Have you ev		_	•			7. If yes, how			s or glasses	s of wine)
3. If you now s			• •			do you dri	nk daily?				
	-		? (Write in numbe	er)	_	☐ Less		□ 1-2	□ 3-4		
4. If you now s	moke or have	smoked i	in the past,					☐ More th			
how many p	acks per day	do/did yo	u smoke on the			8. Do you ha	ve strenu □ 3 tim	ous exerci	se for at lea □ 1 time a	ast 45 mi	in.?
average? (C	hoose the clo	sest numl	ber)			☐ Rare		☐ Never		WEEK	
Less than or	ne-half(½) 🗀] One (1) [☐ One and one-h	alf(11/2	2)	9. Do you fee					
☐ Two (2) ☐	Two and one	-half (21/2)	☐ Three (3)			-			☐ 1 time a	week	
☐ More than th	ree					☐ Rare	•	□ Never			
5. Do you use a	any one of the	e following	tobacco produc	ts?□		10. Do you ea		_		alı	
=	=	_	Smokeless Tobac			☐ Dally		es a week □ Never	☐ 1 time a	week	
6. Do you regu	_					11. Do you u	-		lVes III	10	
V	,			DIC	ΛI 1	HISTORY		ulugs: L	103 11	10	
<u> </u>	•	For An	nual or Exit Exam					2		:_	
1. Are you curr	ently being tr		llness or injury?	- IIIUIC		riange since i] Yes	Lasi Exan	11			
2. Have you be	en treated for	r persister	nt illness or injury?			l Yes	□No				
3. Describe full	ly any "Yes" re	esponses.								_	—
19 19 19											
6. How many o	days of work o	did you mi	ss in the last 12 n	nonths	due '	to your health	?			YES I	NO
7. Have you ev			ation claim or rec					- ational inju	ıry		
or disease?	or boon turns	nd down fo	or life insurance?	YES !		Have you had	Liniurion	from an au	to acciden	+2 □	П
VI	ei been tuine	d down it					rinjunes	iioiii aii au	io acciden	i: 🗀	ä
VI		<u> </u>	CURRE		VIEL	DICINES		day	yr.		
			tetanus immuniz	ation I	boost		/_	/_	···		
Do you current						ever been add					
or medications	? LI Yes LI	No Pleas	e specify:	used	arug	s? 🗌 Yes	⊔ No PI	ease spec	пу:	_	_
Do you take a	ny of the follo	owing me	dications on a d	aily ba	asis.						_
Heart Medicine		☐ Yes	□ No	Asp				☐ Yes	□No		
Thyroid medici		☐ Yes	□ No □ No			essure medici: Water pill)	ne	☐ Yes ☐ Yes	□ No □ No		
Oral medicine Insulin for diab		☐ Yes ☐ Yes	□ No			for seizures		☐ Yes	□ No		
Nerve or sleep		☐ Yes	□ No			sthma medica	tions	☐ Yes	□ No		
Blood thinner	.	☐ Yes	□ No	Oth	er:						
VII			FAM	LY F	IIST	ORY					
	☐ Living	l ist [Diseases			dead, cause	of death		·		_
	☐ Living	List [Diseases		II	dead, cause	of death				_
Brothers: [☐ Living	List [Diseases		I1	f dead, cause	of death				_
	☐ Living		Diseases		I1	f dead, cause	of death				
-			y of the following		¬ ∨	□ NI=				_	
Cancer Insanity	☐ Yes ☐ Yes	□ No □ No	Diabetes Tuberculosis		⊒ Yes ⊒ Yes			usness	□ Yes □ Yes	□ No	
Kidney Diseas		□No	Heart Disease		⊒ Yes		Rheum	iausiii	⊔ res	□ No	

F ...

FOR INITIAL EXAMS ONLY

THIS PAGE IS TO BE COMPLETED ONLY AS INITIAL OR PRE-JOB EXAMS

VIII

PAST JOB HISTORY

LIST ALL JOBS EVER HELD STARTING WITH YOUR FIRST - INCLUDE PART TIME AND VOLUNTEER WORK

NAME OF EMPLOYER	FROM MO/YR	TO MO/YR	# HRS PER WE	WORKI EK/SH		DESCRIPTION OF WORK	POTENTIAL HAZARDS (DUST, FUME HEAT, NOISE, PHYSICAL AGENTS, METAL:		
IX		T	OXIC	EX	POS	SURE HISTORY	A STATE OF THE STA		
At work or at home have (e.g. gases, fumes, dust)							ne chemicals		
List	,				-				
Have you worked with a	iny of the	materials,	or unde	er any	of the	e conditions, listed belo	DW:		
					МО			YES	NO
Asbestos							ked around vibration or with		
Silica (e.g. sandblasting) Coal (e.g. mining)				П		vibrating tools?		Ц	
Grinding						•	ked in a doctor's office,		
Welding							nere you might have had	_	_
Aerosols					П	exposure to biohaz	zardous materials?		
Asphalt, pitch or tar						Have you ever perfe	ormed a site assesment on		
Beryllium							dustry groups or materials?		
Cadmium								_	_
Cotton Dust									
Pesticides									
Fuel Specify:						Any other hazardou			
Oils					$\overline{\Box}$	If "yes," describe th	ese exposures:		
Lead									
Nickel/Chrome						- 			
Paint								YES	NO
Microwave/Radio Freque	ncy					Have you ever lived	I near large industrial plants		
Nuclear Radiation/X-Ray						or areas of air pollu	tion?		
Fiberglass						Have you ever rece	ived hazardous duty or		
Plastics Solvents						environmental pay?			
Compressed Gases							n in the military service?		
Aluminum						-	•	Ц	
ron							sposed to biological or		
Tin						chemical agents (ei	ither in training or combat?)		
Dusty Environments						Have you ever work	red on a HAZMAT team?		
Have you ever worked Where?	around ex	cessive n	oise?			List any second job	os or side businesses you hav	re:	
Have you ever worked cold environment? Where?		•				List your current an	d previous hobbies:		

RESPIRATOR USERS ONLY

THE FOLLOWING 2 PAGES ONLY NEED TO BE COMPLETED BY THOSE ASSIGNED TO USE REPIRATORS.

IF UNCERTAIN ABOUT RESPIRATOR USE, PLEASE COMPLETE

	RESPIRATOR USE				HEART, LUNGS, AND OTHER BODY SYSTEMS (CONT.)		
4	Here was a second and a second	YES			BOD1 3131Em3 (GCN1.)	YES	NO
	Have you <u>ever</u> worn a respirator in the past? What type of respirator <u>did you wear</u> ?				Asthma Chronic bronchitis		
	(mark all that apply)				Emphysema Pneumonia		
	If no go to question 4 ☐ Disposable particulate filter mask				Tuberculosis		
	(non-cartridge dust mask)				Silicosis Lung cancer		
	☐ Half face cartridge respirator ☐ Full face cartridge respirator				Broken ribs		
	☐ Powered air purifying respirator				Pneumothorax (collapsed lung) Any chest injuries or surgeries		
	☐ Supplied air (airline) respirator☐ Self contained breathing apparatus (SCBA)	ı			, my chiest myanisa ar cangentee	_	
2	☐ Escape only respirator If you've ever used a respirator, have you			8. 1	Have you <u>ever</u> had seizures (fits)?		
J.	ever had any of the following problems?		_		Have you <u>ever</u> been told you had diabetes (sugar disease)?		
	Eye irritation Skin allergies or rashes				(Sugai disease):	ч	Ц
	Anxiety General weakness or fatigue				Have you <u>ever</u> had allergic reactions that interfere with your breathing?	П	П
	Any other problem or difficulty that				, , , , , , , , , , , , , , , , , , ,		
	interfered with your use of a respirator	 			Have you <u>ever</u> experienced claustrophobia (fear of closed-in places)?		
	HEART, LUNGS, AND OTHER			12.	Have you <u>ever</u> had trouble smelling odors?		
	BODY SYSTEMS (CONT.)			13. I	Have you <u>ever</u> had any of the following		
1	Have you <u>ever</u> had an abnormal EKG	YES	NO		pulmonary, cadiovascular, lung or heart symptoms?		
ᅻ.	(Electrocardiogram)				Shortness of breath		
	Explain:				Shortness of breath when walking fast on level ground or walking up a slight		
					hill or incline		
5.	Have you ever had any of the following cardiovascular or heart problems?				Shortness of breath when walking with other people at an ordinary pace on		
	Heart attack Stroke				level ground		
	Angina (chest pain)				Have to stop for breath when walking at your own pace on level ground		
	Heart failure High blood pressure				Shortness of breath when washing or		
	Swelling in your legs or feet (not caused by standing or walking)				dressing yourself		
	Heart arrhythmia				Shortness of breath that interferes with your job		
	Any other heart problem that you have been told about	Ц	Ц				
					Do you <u>currently</u> take medication for any of the following problems?		
6.	Have you <u>ever</u> had surgery of the arteries, coronary bypass or angioplasty (to correct			I	Breathing		
	blocked artery or aneurysm)?(mark only				Heart trouble Blood pressure		
	1 answer) Yes, within the past year				Seizure (fits)		
	Yes, more than 1 year ago No			15	Have you within the <u>past</u> had any of the		
_			_		the following symptoms of lung illness?		
6.	Have you ever had any of the following pulmonary or lung problems?				Coughing that produces phlegm	_	
	Asbestosis			((thick sputum)		

FULL FACE OR SCBA HEART, LUNGS, AND OTHER REPIRATOR USER ONLY (CONT.) **BODY SYSTEMS (CONT.)** YES NO YES NO 19. Have you ever had an injury to your ears, Coughing that occurs mostly when you \Box \Box including a broken ear drum? are lying down 20. Do you currently have any of the following Coughing up blood in the last month hearing problems? Wheezing Diffculty hearing Wheezing that interferes with your job Wear a hearing aid Chest pain when you breath deeply Any other hearing or ear problem Coughing that wakes you early in the Explain: ___ morning Any other symtoms that you think may be related to lung problems 16. Have you ever had any of the following cardiovascular or heart symtoms? 21. Have you ever had a back injury? Frequent pain or tightness in your chest 22. Do you currently have any of the following Pain or tightness in your chest during muscle or skeletal problems? physical activity Weakness in any of your arms, hands, Pain or tightness in your chest that legs or feet interferes with your job П Back pain In the past two years, have you noticed your heart skipping or missing a beat? Difficulty fully moving your arms and legs Heartburn or indigestion that is not Pain or stiffness when you lean forward related to eating or backward at the waist Any other symtoms that you think might Difficulty fully moving your head up and down □ be related to heart or circulation problems $\ \square$ Difficulty fully moving your head side to side $\ \square$ **FULL FACE OR SCBA** REPIRATOR USER ONLY Difficulty bending at your knees The following questions must be answered by every employee who has been selected to use either a full-face Difficulty squatting to the ground piece respirator or Air Supply Respirator (Self-Contained Breathing Apparatus [SCBA] or air line). Difficulty climbing a flight of stairs or a YES NO ladder carrying more than 25 lbs. П 17. Have you ever lost vision in either eye (temporarily or permanently)? Any other muscle or skeletal problems that might interfere with using a 18. Do you currently have any of the following respirator vision problems? Explain: Wear contact lenses П \Box Wear glasses Color blind Any other eye or vision problem

X		FOR Y	EARL	Y / E)	(IT E	XAMIN	ATIONS	ONLY			
1.	a.	Approximately how many days last examination?							ur		
	b.	Approximately how many days	in Leve	IC (us	ing an	air-purify	ying respir	ator)?			
	C.	Approximately how many days	in Leve	IB (se	lf-cont	ained bre	eathing ap	paratus or air	line)?		
2.		proximately how many different has examination?	azardoı	ıs mate	erial si	ites have	you worke	ed on since yo	ur		
3.		at were the chemical or other had mination? (e.g. gasoline, arsenic						ential exposur	e since your	last	
<u>Che</u>	emicals of			•	Exposi	<u>ure Frequ</u>	<u>ency</u>	Ē	xposure Dura	<u>tion</u>	
		# of Days		Daily	l v	Veekly	Monthly	< 1 Hr.	1-8 Hrs.	> 8 F	lrs.
	· · ·-										
4.	Since vo	our last exam, have you had diffi	iculty do	ina vo	ur iob	because	of:		· · · · · · · · · · · · · · · · · · ·		
a.		ity to chemicals, dust, sunlight, etc.?			,	Yes	No	Don't Know			
b.		to perform certain motions? (circle o				Yes	No	Don't Know			
C.		to assume certain positions? (circle	one)			Yes	No	Don't Know			
d. e.		ess? (circle one) edical reasons? (circle one)				Yes Yes	No No	Don't Know Don't Know			
5.		a experienced any health sympto	me that	may h	o rola				atoriale einee	wour la	ot.
		If so, please describe:	mo mai	inay c	ic rola	tou to ex	posures to	nazaraous m	atorialo offico	your lac	J L
6	Since vo	our last examination, have you h	nad anv	tvne c	of illne	ss that re	sulted in n	ore than 3 co	nsecutive da	vs lost ti	me
	_	Yes No List:	idd dily	type c	// IIII IC.	oo mat ro	Sullou III II	ioro triair o oo	1100001110 00	, 0 1001 11	
		- 1			`	r 1 N		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			
7.	•	eel that you have and/or had exp				[] N	lo []Y	es Whei	<u> </u>		
		how would you quantify your pote				l None	[]] laka	NA/P			
	[] very	significant [] Significant [u ever had any symptoms or sign	jinsigi S (o.a. i	iiiicaiii rach) w	hich v	l Mone	ute to tick)WII hitae2	2aVI 1 0		
		olease describe:	ıs (e.g. i	asii) w	vilicii y	ou allino	ute to tick	oues: [] ia	0 [] 163		
	11 103,1	piedae describe.									
8.	a. How w	ould you rate the effectiveness c	of the he	ealth a	nd saf	ety proce	edures use	d for work?			
	Check O] Goo		[]Excelle				
b.	Commen	its:									
			YES	NO						YES	NO
9.	Have yo	ou ever had an illness,			10.	Have y	ou ever de	veloped illnes	s or		
	conditio					sympto				_	
	• •	m which:						ere related to			
		ed only during work?			11.	•		orked with a su			
		ed only after work, in evening?					•	nose, chest, o	or sinuses	_	
		ed when you begin work after				conges					
	a week	kend or holiday?			12.	•	ou ever wo	orked with sub	stances		
	Dicanna	ared during vacations or weekends?				that	l vour ekin	or caused a r	ash?		
	Disappe	area adming vacations of weekends!	_			mialec	a your skill	or causeu a r	uon:	YES	NO.
13.		you like to talk to the healthcare parts this guestionnaire?	professi	onal w	ho wil	l review t	this questio	onnaire about	your		
	answer	s to this questionnaire?	NA NO 4		r-	TUE PE	MA INIINIA	PECTIONS			
		STOP!: PHYSIC	JIANS (JUMPI		THE KE	MAINING S	SECTIONS.			

	WEIGHT	TE	EMP.	BLOOD PRESSURE	
inches	lbs.		°F		
PULSE (Resting)	For	D.O.T. only:	Pulse immediatel	ly after 2/min. exercise:	
/m	in.	<u> </u>			-
VISION Visu		ant wears glasse and without glas	es, test and record sses.)	COLOR VISION	
NEAR	Left	Right	Both	Normal	
Corrected		20/	20/	Abnormal	
Uncorrected	20/	•		Can recognize Red & Green	
FAR	Left	Right	Both	PERIPHERAL VISION	
Corrected	20/	20/	20/	Normal	
Uncorrected	20/	20/	20/	Abnormal	
URINALYSIS					
Specified Gravity	Album	in	Female: LMP		
Sugar	Blood				
AUDIOGRAM (if r					
5	00 10	00 20	000 3000	4000 6000	
Right					
Left					_
	umentation must t	 be forwarded to	—— ——— WorkCare		-
Left					_
Left Note: Testing docs SPIROMETRY (If	marked YES on E	xam Checklist):		FEV,	-
Left Note: Testing doc SPIROMETRY (If FVC Ob	marked YES on E oserved Vol.	Exam Checklist):		FEV ₁ %	_
Left Note: Testing doc SPIROMETRY (If FVC Ob	marked YES on E eserved Vol.	FEV,	Observed Vol.	 %	_
Left Note: Testing doci SPIROMETRY (If FVC Ob FVC Pre Note: Testing doci	marked YES on E eserved Vol. edicted % umentation must b	FEV ₁ FEV ₁ pe forwarded to	Observed Vol.	 %	_
Left Note: Testing docs SPIROMETRY (If FVC Ob FVC Pre	marked YES on E eserved Vol. edicted % umentation must b	FEV ₁ FEV ₁ pe forwarded to	Observed Vol.	 %	_
Note: Testing door SPIROMETRY (If FVC Ob FVC Pre Note: Testing door EKG (If marked Yi	marked YES on E eserved Vol. edicted % umentation must b ES on Exam Chec	FEV, FEV, FEV, See forwarded to sklist);	Observed Vol. Predicted % WorkCare	 %	_
Left Note: Testing door SPIROMETRY (If FVC Ob FVC Pre Note: Testing door EKG (If marked Yill Normal	marked YES on Epserved Vol. edicted % umentation must be ES on Exam Checo Abnormal ps must be forward	FEV, FEV, oe forwarded to sklist); ded to WorkCare	Observed Vol. Predicted % WorkCare	 %	

SPECIMEN COLLECTION PER EXAM CHECKLIST

All laboratory specimens must be shipped by the day of the exam! If this is a Friday exam, mark Airbill for Saturday delivery. Exam data should be included for shipment in the box with the laboratory specimens.



Health, Safety, and Environment

MEDICAL SURVEILLANCE EVALUATION

Attachment 24-2

Revision 1: Sept 2005

	1 32							
	Yes	No						
			be exposed to airborne lead concentrations at or above the OSHA action level or are you currently in a job that requires you to be in a medical surveillance program for lead (i.e., removal of lead based paint or other demolition activities)?					
Radiation			Are you classified as a radiation worker?					
DOT Driver			Do you drive a truck with a gross vehicle weight rating of 10,000 pounds or more during company trips?					
Biohazard			Does you job require work with bloodborne pathogens?					
Remediation			Do you perform remediation construction activities, field construction sampling, or supervision activities at hazardous waste remediation sites or hazardous waste treatment, storage, or disposal (TSD) facilities which could expose you to hazardous substances above permissible exposure levels (i.e., work in exclusion zones)?.					
			If yes, how many days per year? 🛄 1-29 🛄 30+					
Field and Lab			Answer Yes if you do ANY of the following: a) Work at HAZWOPER sites 1 to 29 days per year b) Perform waste disposal activities c) Perform non-HAZWOPER environmental sampling d) Work in a chemistry laboratory 30 or more days per year e) Work on a pilot plant project 30 or more days per year f) Conduct bench scale operations 30 or more days per year					
Other			Site/project specific biological monitoring or toxicological screening as specified by the project-specific health and safety plan.					
Distribution: ☐ Supervisor ☐ Local Health, Safety, and Environment Representative ☐ Medical Service Provider, WorkCare								
Employee Signature Date								
Supervisor Si	gnatur	е	Date					



Date: Name: Phone # (

SSN#

Health, Safety, and Environment

MEDICAL SURVEILLANCE EVALUATION

Attachment 24-2

Revision 1: Sept 2005

This information will be used to determine routine medical screening exams for employees who work outside of an office setting. In addition, Site Health and Safety Plans may specify project related medical surveillance for regulated substances.

Please answer each question.

)

Employee #	_				
Job Title					
Location:					
Division:					
Region/Busine	ss Unit:				
Supervisor:					
HSE Representative:					
•					
Choose One					
() New Empl			() Current employee with job change		
() Transfer fr	rom		OFFICE		
surveillance			assess federally mandated medical screenings and s:		
	Yes	No			
Respirator	Yes		Does your job require you to wear a respirator or be certified for respirator use?		
	Yes		Does your job require you to wear a respirator or be certified for respirator use? If yes, how many days per year? 1-29 30+		
Respirator Hearing	Yes		Does your job require you to wear a respirator or be certified for respirator use?		
	Yes	No	Does your job require you to wear a respirator or be certified for respirator use? If yes, how many days per year? 1-29 30+ Does your job require you to wear hearing protection because you: a) Work in an environment where noise levels equal or exceed an 8-hour time-weighted average of 85 decibels? b) Perform construction activities or construction management around heavy equipment on a construction project more than		



Health, Safety and Environment

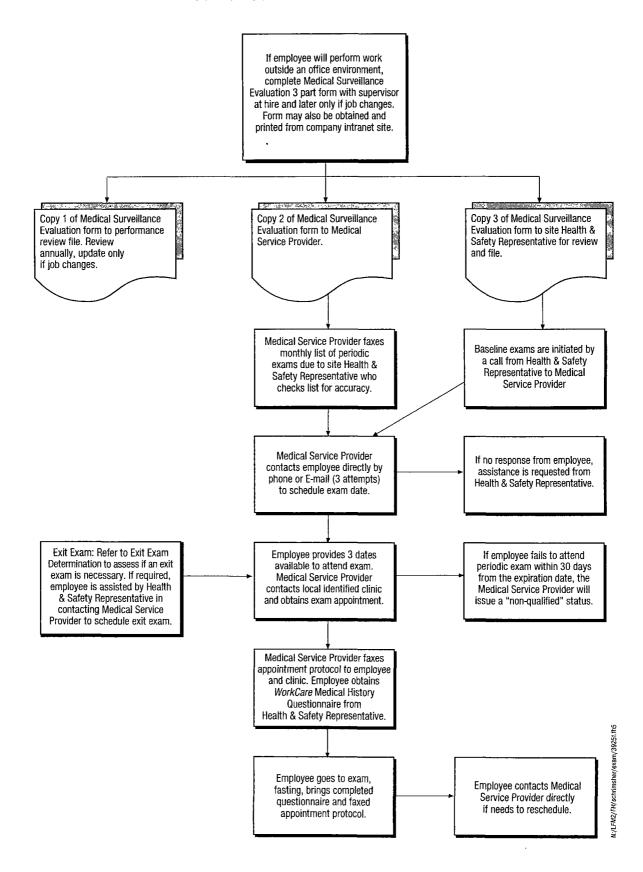
Attachment 24-3

Medical Screening and Surveillance Exam Protocol

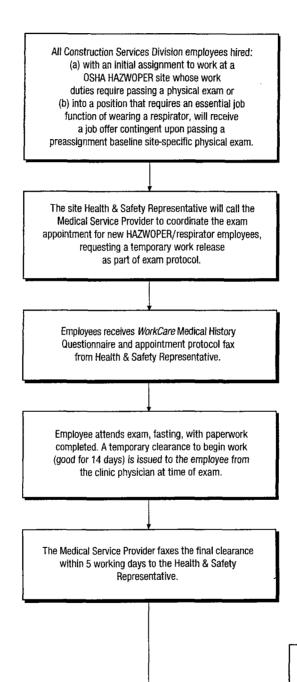
PROTOCOL	HAZWOPER	HAZWOPER	HAZWOPER	DOT Driver	ASBESTOS	MINI-
	Baseline or	Annual	Exit	Certification	(Baseline, Annual	RESPIRATOR
	Preassignment	or	Lant	(Baseline and	and Exit)	(Baseline and
	Baseline	Biennial		Biennial)	and Exity	Biennial)
Medical History	Dascinic	Bicilitai		Dicimiai)		Dienman
& Respiratory	X	X	l x	X	x	x
	Λ	Λ	^	Λ	A	•
Questionnaire						<u> </u>
OSHA Asbestos						
Questionnaire					X	
(Initial or			1			
Periodic)						
Medical Exam	X	X	X	X	X	If indicated by
Physical Exam	· · · · · · · · · · · · · · · · · · ·					questionnaire
(height, weight,			l <u>.</u> i			
pulse, oral	X	X	X	X	X	
temperature,]			
blood pressure)	·					
Non-resting pulse			1	X		
Vision	X	X	X	X	X	
Urinalysis	X	X	X	X		
Audiogram		1			(If indicated by	
(hearing test)	X	X	x	x	project noise	
(meaning rest)	Λ	^	^	Λ.		
Cainamaturi		 	-		levels)	
Spirometry	**	<u></u>	.		<u> </u>	
(pulmonary	X	X	X		X	X
function test)		<u> </u>			<u> </u>	
Electro-cardiogram (EKG)					
EKG Age < = 40		Every 3 years				
	X	for annual, every				
		4 years for				
		biennial	į į			
EKG Age 41-55	X	Every 2 years				
EKG Age 56+		Every year for				
LKG Age 301	X	annual, every 2				
	Λ					
		years for			1	
Chest x-ray (one view		biennial			+	
Age $<$ or $= 40$	·	Exami A years	If symptomatic or	·	Baseline and every	
Age \ 01 - 40	v	Every 4 years				
	X		due on periodic		5 years per OSHA	
41.50		ļ			1910.1001	
Age 41-50		Every 3 years	If symptomatic or		Baseline and every	
	X	for annual, every	due on periodic		2-5 years per	
		4 years for	1		OSHA	
		bienniał			1910.1001	
Age 51-54		Every 2 years	If symptomatic or		Baseline and every	
	X	'	due on periodic		2-5 years per	
			·		OSHA	
					1910.1001	
Age 55+	·	Every year for	If symptomatic or		Baseline and every	
1180 331	X	annual, every 2	due on periodic		1-5 years	
	Λ		ane on perionic			
		years for			per OSHA	
		biennial			1910.1001	
B-reader		ļ <u>.</u>			X	
Complete Blood						
Count with White	X	X	X			
Cell Differential			[
Blood Chemistry	X	X	X			

^{*}Note: Additional entry, periodic, and exit biological monitoring or toxicological screening may be indicated in the project-specific health & safety plan. Examples include: blood lead/ZPP, serum/RBC cholinesterase, urine heavy metals (arsenic, cadmium, mercury, chromium, or beryllium), urine radiation (thorium, uranium), biological vaccinations (hepatitis B, hepatitis A), blood benzene, blood beryllium LPT, etc.

Medical Surveillance Exam Process



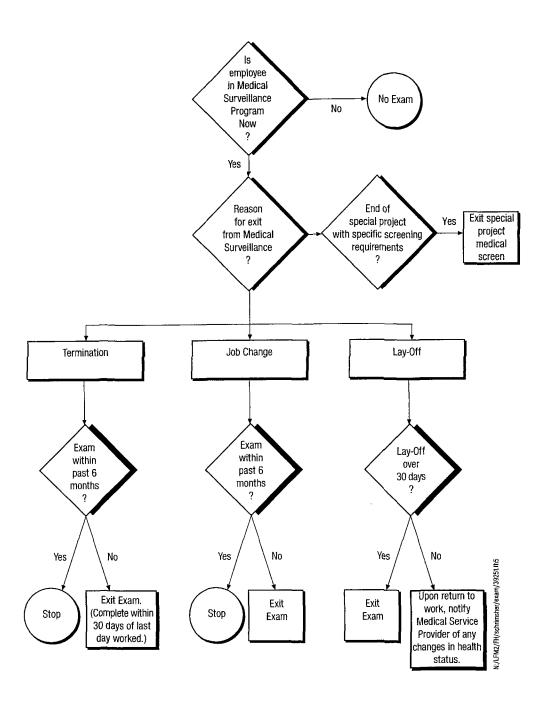
Construction Services Division HAZWOPER & Respirator Preassignment Baseline Exam Process



/LFM2/FH/schrimsher/exam/3925

If there are work restrictions, an evaluation will be made to see if an alternative job is available. If none, the offer will be terminated and the individual will be released.

Exit Exam Determination



Note:

Exit exams from Medical Service Provider or previous employer may be used for review as a URS Corporation baseline exam if completed within the past 3 months. A *WorkCare* Medical History Questionnaire is completed by the employee and submitted with a copy of the previous exam for physician review and approval.



Health, Safety, and Environment

WAIVER OF EXIT MEDICAL SURVEILLANCE EXAM

Attachment 24-7

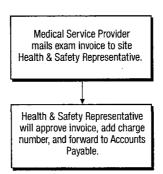
Revision 1: Sept 2005

I have been a participant in URS' Medical Screening & Surveillance Program, which entitles me to an exit medical surveillance exam upon reassignment to a position that does not require medical clearance or termination of my employment. I understand that URS encourages employees to schedule and complete an exit medical exam; however, I voluntarily relinquish the opportunity to have an exit medical exam.

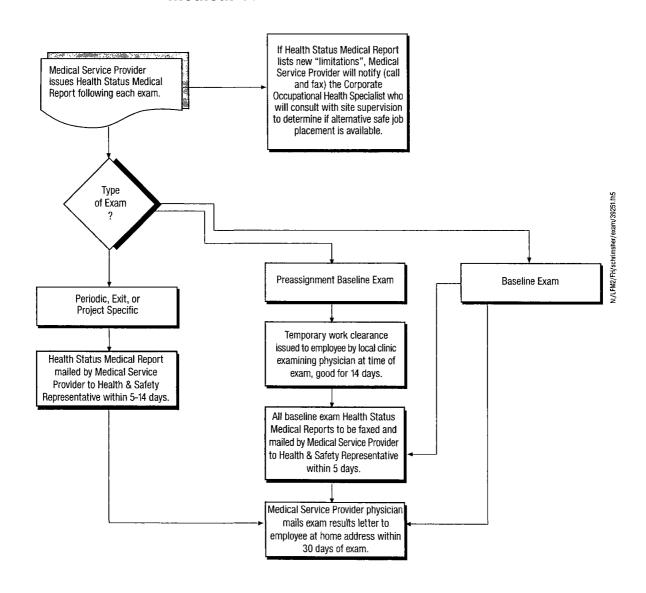
Name				
Employee	Number			
Date				
Employee	Signature:			

Exam Follow Up Procedures

Billing



Medical Surveillance Exam Clearances





Health, Safety, and Environment

FIELD FIRST AID KIT SUPPLY LIST

Attachment 24-9

Portable plastic or metal water-resistant first aid kit with handle

Bloodborne pathogens personal protective equipment kit (minimum requirements are latex gloves and CPR shield)

First aid manual

Ace bandage 3"

Assorted band aids

Sterile gauze pads 4" x 4"

Sterile non-stick gauze pads 2" x 3"

Paper tape (hypo-allergenic)

Burn ointment (for minor burns; use after cold water soak)

Antibiotic ointment (Neosporin or generic)

Alcohol prep pads

lodine prep pads (if not allergic to iodine; use after soap and water wash for bloodborne exposure)

Ice pack

Gauze roll 2"

Butterfly strips (wound closure)

Tweezers (one use, disposable)

Temperature strips

Flashlight

Triangular bandage

Bandage scissors

Sterile normal saline eye wash, 4 ounce bottle

Ammonia inhalant ampoules

Insect sting relief wipes or spray

1. Applicability

1 3

This standard applies to the operations of URS Corporation and its subsidiary companies where personnel may encounter noise exposures that may exceed 85 decibels, measured using an "A" weighted scale (dBA), as an 8-hour time weighted average (TWA).

For non U.S. operations, refer to the country/region specific SMS and regulations.

2. Purpose and Scope

The purpose of this procedure is to protect employees from hazardous noise exposures and to prevent hearing loss.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure.

4. Requirements

A. General

The use of hearing protectors is required in any location where powered or motorized equipment or any other noise source could reasonably be expected to exceed 85 dBA. Use of hearing protectors may only be discontinued when noise levels are verified to be less than 85 dBA through a properly conducted noise survey. Whenever information indicates that any employee's exposure may equal or exceed an 8-hour TWA of 85 dBA, the project manager or location manager will be responsible to enforce the proper use of hearing protectors.

B. Hearing Protectors

 Require that at least two (2) types of hearing protectors are available to employees free of charge, preferably a plug and a muff type.

2. Minimum Noise Reduction Ratings (NRR)

Hearing protectors issued must have the following minimum NRR:

Ear Plug

Muffs 27 dBA

29 dBA

Require that hearing protectors are used in accordance with manufacturer's specifications and thus effectively protect hearing.

C. Noise Surveys

- Noise surveys must be conducted in a manner that reasonably reflects the exposure of the affected employees. Surveys must be conducted under the supervision of a URS Health, Safety, and Environment (HSE) Representative.
- Sound level meters and audio dosimeters used to determine employee exposure to noise sources must be Type II (accurate to within +/- 2 dBA), operated in "slow" response, on the "A" scale, and be calibrated to factory guidelines (including periodic factory recalibration).

D. Noise Controls

Eliminate noise sources to the extent possible. Examples of controls that must be considered include:

- 1. Addition or replacement of mufflers on motorized equipment.
- 2. Addition of mufflers to air exhausts on pneumatic equipment.
- 3. Following equipment maintenance procedures to lubricate dry bearings.
- 4. Isolation of loud equipment with barriers.
- 5. Replacement of loud equipment with newer and quieter models.

E. Audiometric Exams

1. Tests

Details on the medical surveillance program (including audiometric testing) are included in <u>SMS 24</u>.

Audiometric tests shall be performed by a person meeting the requirements described in 29 CFR 1910.95(g)(3). Within 6 months of an employee's first exposure at or above the action level, a valid baseline audiogram shall be established against which subsequent audiograms can be compared. Testing to establish a baseline audiogram shall be preceded by 14 hours without exposure to noise. Hearing protectors may be used as a substitute for the requirement that baseline audiogram shall be preceded by 14 hours without exposure to workplace noise. The medical surveillance provider shall notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination. For multi-year projects, an annual audiogram shall be obtained for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if there is a standard threshold shift (STS). A standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear. If the annual audiogram shows that an employee has suffered a STS, the employer will obtain a retest within 30 days and consider the results in assessing an STS as the annual audiogram. The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. If an STS has occurred, the medical surveillance provider will notify the employee within 21 days of the determination.

2. Standard Threshold Shifts

If an employee's test results show a confirmed STS, their hearing protection will be evaluated and refitted, and a medical evaluation may be required.

F. Training

Verify that each employee who must work in a noisy environment is current on required Hearing Conservation Training. Training must include the following topics:

1. The effects of noise on hearing.

- 2. The purpose of hearing protectors.
- 3. The advantages and disadvantages of various types of hearing protectors.
- 4. The attenuation of various types of hearing protection.
- 5. The selection, fitting, care, and use of hearing protectors.
- 6. The purpose of audiometric testing.
- 7. An explanation of the audiometric testing procedure.

5. Documentation Summary

- A. File these records in the Safety Filing System:
 - 1. Noise surveys, when applicable.
 - 2. Training Records.

6. Resources

- A. U.S. OSHA Standard Occupational noise exposure 29 CFR 1910.95
- B. U.S. OSHA Construction Standard <u>Occupational noise exposure 29 CFR 1926.52</u>
- C. U.S. OSHA Technical Links Noise and Hearing Conservation
- D. American Industrial Hygiene Association: The Occupational Environment
 Its Evaluation and Control, Chapter 20. Fairfax, VA: 1997
- E. National Hearing Conservation Association web site
- F. URS SMS 24 Medical Screening and Surveillance

1. Applicability

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This standard applies to all operations of URS Corporation and its subsidiary companies.

2. Purpose and Scope

This procedure provides information on recognizing those conditions that require PPE as well as selecting PPE for hazardous activities.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure.

4. Requirements

- A. Perform hazard assessments for those work activities that are likely to require the use of PPE.
 - 1. Use Attachment 29-1 to perform the assessment.
 - 2. Reevaluate completed hazard assessments when job conditions or duties change.
- B. Eliminate the hazards identified in <u>Attachment 29-1</u>, if possible, through engineering or administrative controls.
- C. Select PPE that will protect employees if hazards cannot be controlled or eliminated.
 - 1. See Attachment 29-1 for recommended PPE.
 - 2. Review Material Safety Data Sheets for chemicals used for PPE recommendations.
 - 3. If needed, consult with the URS Health, Safety, and Environment (HSE) Representative for assistance in selecting PPE.
- Provide required PPE to employees free of charge (excluding, in some instances, components of standard work attire such as steel-toed boots),

assuring proper fit and providing a choice if more than one type of PPE is available.

- E. Whenever a hazard is recognized and PPE is required, the employees will be provided with the appropriate PPE. However, when PPE is not required and the employee elects to wear his or her own PPE, the manager directing activities shall ensure that the employee is properly trained in the fitting, donning, doffing, cleaning, and maintenance of his or her employee owned equipment.
- F. Conduct and document employee training.
 - 1. Train all employees who are required to wear PPE.
 - 2. Require that training includes:
 - a. When PPE is to be worn.
 - b. The type of PPE necessary for the task to be completed.
 - c. How to properly don, doff, adjust and wear PPE.
 - d. Limitations of PPE.
 - e. Proper care, maintenance, useful life and disposal of PPE.
 - 3. Training must be conducted before PPE is assigned.
 - 4. Refresher training is needed when:
 - a. New types of PPE are assigned to the worker.
 - b. The worker cannot demonstrate competency in PPE use.
 - 5. Keep written records of the employees trained and type of training provided, including the date of training.
- G. Maintain Protective Equipment
 - 1. Check PPE for damage, cracks, and wear prior to each use. Replace or repair equipment not found in good condition.
 - 2. Decontaminate non disposable PPE with appropriate cleaner, as necessary, to prevent degradation of the equipment. Staff will remove any non-impermeable PPE/clothing that becomes

contaminated with hazardous substances. These instructions are reiterated in the emergency decontamination procedures in the HASPs.

H. Periodically inspect worksites where employees are using PPE using Attachment 29-2.

5.0 Documentation Summary

1 1

1........................

- A. Records required in the Safety File:
 - 1. Completed Hazard Assessment Certification Forms (<u>Attachment 29-1</u>)
 - Completed Personal Protective Equipment Inspection Sheet (<u>Attachment 29-2</u>)
 - 3. Documentation of employee training.
- B. Records required in the Office/Laboratory Safety Filing System:
 - 1. Completed Hazard Assessment Certification Forms (<u>Attachment 29-1</u>)
 - 2. Completed Personal Protective Equipment Inspection Sheet (Attachment 29-2)
 - 3. Documentation of employee training.

6.0 Resources

- A. U.S. OSHA Standards <u>Personal Protective Equipment -29 CFR 1910, Subpart I</u>
- B. U.S. OSHA Construction Standard <u>Personal Protective Equipment –29</u> CFR 1926 Subpart E
- C. U.S. OSHA Technical Links Personal Protective Equipment
- D. Australian Standards SAA HB9-1994 Occupational Personal Protection
- E. American National Standards Institute, <u>ANSI Z89.1-2003</u>, Protective Headwear

- F. American National Standards Institute, <u>ANSI Z87.1 1989</u>, Eye and Face Protection
- G. American Society for Testing and Materials, <u>ASTM F13-WK4519</u>, Specification for Personal Protective Footwear
- H. SMS 40 Fall Protection
- I. <u>Queensland Workplace Health and Safety</u> Personal Protective Equipment
- J. Attachment 29-1 Hazard Assessment Form
- K. Attachment 29-2 PPE Inspection Form
- L. Attachment 29-3 Eye and Face Protector Selection Guide
- M. Best Manufacturing Co. http://www.chemrest.com/



L._J

Health, Safety, and Environment HAZARD ASSESSMENT CERTIFICATION FORM

Attachment 29-1

Revision 1: Sept 2005

				Eliminate hazard or
Are	any of the following hazards present during the task?	Yes	No	use the following PPE
19.	Temperature extremes – cold			Insulated gloves
20.	Blood, fungus, biological agents			Nitrile gloves
21.	Exposure to live electrical currents			Electrical gloves, consult HSE representative
22.	Sharp tools, machine parts, etc.			Leather or Kevlar gloves
23.	Material handling			Leather gloves
	Foot Ha	azards	4. 4. 5.5	
24.	Heavy materials (greater than 50 pounds) handled by employees			Safety shoes or boots
25.	Potential to crush whole foot			Safety shoes or boots with metatarsal guard
26.	Sharp edges or points (puncture risk)			Safety shoes or boots
27.	Exposure to electrical wires			Safety shoes or boots with electrically conductive soles
28.	Slippery conditions	MEDICAL CO.		Rubber soled boots or grips
29.	Chemical contamination	1 1994 Na.		Rubber, nitrile boots or boot covers
30.	Wet conditions	m,		Rubber boots or boot covers
31.	Construction/demolition			Safety shoes or boots with metatarsal guard if foot crushing hazard exists
+ 1, 1 1	Fall Ha	zards		
32.	Elevations above 4 feet (general industry) or 6 feet (construction) without guardrails			ANSI A-10.14 Type 1 full body harness
33.	Suspended scaffolds, boatswain's chairs, float scaffolds, or suspended staging			ANSI A-10.14 Type 1 full body harness
34.	Working in trees			ANSI A 10:14 Type 1 full body harness
35.	Working in vehicle-mounted elevating work platforms (e.g., bucket trucks, aerial lifts)	· 30.5 · ·		ANSI A-10.14 Type 1 full body harness
	Water H	azards		
36.	Working on or above water where a risk of drowning exist	3 10		US Coast Guard approved personal floatation device; Type I, II, or III
6.45	Excessive He	eat or Fla	me .	
37.	Full body chemical protective clothing in temperatures greater than 80 F	A trans tosa A trans tosa A dis dis		Cooling vest
38.	Work around molten metal or flame	ry yer rijas Paran, aijas		Nomex or Keylar clothing
39.	Welding activities			Welding leathers for those areas that are exposed to flame, spark, or molten metal



Health, Safety, and Environment HAZARD ASSESSMENT

Attachment 29-1

CERTIFICATION FORM

Revision 1: Sept 2005

Location:		Job No.:	
Date:	Assessment conducted by: _		
Specific tasks perfo	ormed at this location:		
	T. 10 13		Commence of the Commence of th

		"Ill: ' -r-Achtimi: "I	- TANKE - Y - W 7/98/L 1
	any of the following hazards present during the task?	Yes No	Eliminate hazard or use the following PPE
200	Overhead	l Hazards	
1.	Suspended loads that could fall		Hard hat, ANSI Z89, Class A, B or C
2.	Overhead beams or loads that could strike head		Hard hat, ANSI Z89, Class A, B or C
3.	Energized wires or equipment that could strike head		Hard hat, ANZI Z89; Class A or B (dependent on potential voltage)
4.	Employees working beneath an elevated site where objects could be dropped onto them	***************************************	Hard hat, ANSI Z89, Class A, B or C
5.	Sharp objects or corners at head level	1 Maria	Hard hat, ANSI Z89, Class A, B or C
	Eye Ha	azards	
6.	Chemical splashes or irritating mists		See Attachment 29-3
7.	Excessive dust		Safety glasses or goggles
8.	Smoke and/or fumes	78730 P	Safety goggles
9.	Welding operations	F Newson	See Attachment 29-3 and 29-4
10.	Lasers/optical radiation		Have URS HSE Representative assist you in proper selection
11.	Projectiles		Safety glasses or goggles plus face shield
12.	Sawing, cutting, chipping, and/or grinding	* **	See Attachment 29-3
	Face H	azards	
13.	Chemical splashes or irritating mists		See Attachment 29-3; add face shield is irritating or corrosive
14.	Welding operations		See Attachment 29-3 and 29-4
15.	Projectiles		Safety glasses or goggles plus face shield
	Hand H	azards	
16.	Chemical exposure	E E E E E E E E E E E E E E E E E E E	Use chemical resistant gloves specific to hazard; consult MSDS, chemical hazard guide, or HSE Representative
17.	Sharp edges, splinters, etc.		Leather or Kevlar gloves
18.	Temperature extremes – heat		Leather gloves, Kevlar gloves, welder's gloves, hot mill gloves

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Health, Safety, and Environment HAZARD ASSESSMENT CERTIFICATION FORM

Attachment 29-1

Revision 1: Sept 2005

Are	any of the following hazards present during the task?	Yes No	Eliminate hazard or use the following PPE
i sy a	Respirator	y Hazards	
40.	Refer to SMS 042 for respirator selection guidance		
A	Excessi	ve Noise	
41.	Exposure to noise		Ear plugs or muffs
	Body and Le	g Protection	
42.	Chemical exposure		Contact URS HSE Representative for assistance in proper selection
43.	Using chainsaw, cutting brush		Chainsaw chaps

I certify that the above hazards present on	ve inspection was performed to the b	best of my knowledge and ability, based on the
·		
Signature		



Health, Safety, and Environment

PERSONAL PROTECTIVE EQUIPMENT INSPECTION SHEET

Attachment 29-2

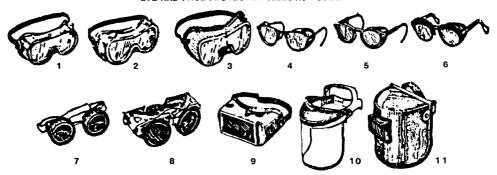
Revision 1: Sept 2005

Name of Inspector Date		Inspected		
			True	False (= Hazard - Needs to be fixed)
- 14 Y -	Hard Hats			
1.	The brim or shell does not show signs of exposure and excess loss of surface gloss, chalking or flaking.	ive wear,		
2.	Suspension system in hard hat does not show signs of deterior including cracking, tearing or fraying.	ation		
3.	The brim or shell is not cracked, perforated or deformed.			
4.	Employees use hard hats in marked areas.			
5.	Areas requiring hard hat usage are marked.			
er een Si inge	Safety Shoes			
6.	Safety shoes used by employees do not show signs of excessi	ve wear.		
7.	Areas requiring safety shoes are marked.			
les 0	Work Gloves		ri daga ji	
8.	Gloves are worn when needed.			
9.	Gloves do not show signs of excessive wear such as cracks, so lacerations, thinning or discoloration or break through to the sk			
2 4 44	Protective Clothing			
10.	Protective clothing is worn by employees when required.			1
5 (\$.5 × 5 × × ×	Hearing Protection			
11.	Noise hazard areas are posted.			
12.	Employees are using earplugs or muffs when using noise prod equipment or working in posted noise hazard areas.	ucing		
1 3% 200	Safety Glasses	awiji Tirangan		
13.	Eye hazard areas are marked or posted.			
14.	Employees use safety glasses when working in eye hazard are working with equipment which produces an eye hazard.	eas or		
REM	MARKS			
				

URS Corporation

URS Corporation Health & Safety Program

EYE AND FACE PROTECTOR SELECTION GUIDE



- 1. GOGGLES, Flexible Fitting, Regular Ventilation
- 2. GOGGLES, Flexible Fitting, Hooded Ventilation
- 3. GOGGLES, Cushioned Fitting, Rigid Body

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- *4. SPECTACLES, Metal Frame, with Sidoshields
- *5. SPECTACLES, Plastic Frame, with Sideshields
- *6. SPECTACLES , Metal-Plastic Frame, with Sideshields
- WELDING GOGGLES, Eyecup Type, Tinted Lenses (Illustrated)
- 7A. CHIPPING GOGGLES, Eyecup Type, Clear Safety Lenses (Not Illustrated)
- *8. WELDING GOGGLES, Coverspec Type, Tinted Lenses (Illustrated)
- 8A. CHIPPING GOGGLES, Coverspec Type, Clear Safety Lonses (Not Illustrated)
- *9. WELDING GOGGLES, Coverspec Type, Tinted plate Plate Lens
- FACE SHIELD, (Available with Plastic or Mesh Window)
- 11. WELDING HELMETS

APPLICATIONS				
OPERATION	HAZARDS	RECOMMENDED PROTECTORS Bold Type Numbers Slightly Preferred Protection		
ACETYLENE-BURNING ACETYLENE-CUTTING ACETYLENE-WELDING	SPARKS, HARMFUL RAYS MOLTEN METAL, FLYING PARTICLES	7,8,9		
CHEMICAL HANDLING	SPLASH, ACID BURNS, FUMES	2,10 (For severe exposure add 10 over 2)		
CHIPPING	FLYING PARTICLES	1,3,4,5,6,7A,8A		
ELECTRIC (ARC) WELDING	SPARKS, INTENSE RAYS, MOLTEN METAL	9,11 (11 in combination with 4,5,6 in tinted lenses, advisable)		
FURNACE OPERATIONS	GLARE, HEAT, MOLTEN METAL	7,8,9 (For severe exposure add 10)		
GRINDING-LIGHT	FLYING PARTICLES	1,3,4,5,6,10		
GRINDING -HEAVY	FLYING PAPTICLES	1,3,7A,8A (For severe exposure add 10)		
LABORATORY	CHEMICAL SPLASH, GLASS BREAKAGE	2 (10 when in combination with 4,5,6)		
MACHINING	FLYING PARTICLES	1,3,4,5,6,10		
MOLTEN METALS	HEAT, GLARE, SPARKS, SPLASH	7,8 (10 in combination with 4,5,6 in tinted lenses)		
SPOT WELDING	FLYING PARTICLES, SPARKS	1,3,4,5,6,10		

^{*} Non-side shield spectacles are available for limited hazard use requiring only frontal protection.

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Health, Safety, and Environment WELDING LENS SELECTION

Attachment 29-4

Revision 1: Sept 2005

Operations	Electrode Size 1/32 inch	Arc Current	Minimum Protective Shade
Shielded metal arc welding (SMAW)	Less than 3	Less than 60	7
SMAW	3 – 5	60 – 160	8
SMAW	5 – 8	160 – 250	10
SMAW	More than 8	250 – 550	11
Gas metal arc welding and flux cored arc welding		Less than 60	7
Gas metal arc welding and flux cored arc welding		60 - 160	10
Gas metal arc welding and flux cored arc welding		160 – 250	10
Gas metal arc welding and flux cored arc welding		250 - 500	10
Gas tungsten arc welding		Less than 50	8
Gas tungsten arc welding		50 – 150	8
Gas tungsten arc welding		150 - 500	10
Air carbon arc cutting	(light)	Less than 500	10
Air carbon arc cutting	(heavy)	500 – 1000	11
Gas tungsten arc welding		Less than 20	8
Gas tungsten arc welding		20 – 100	8
Gas tungsten arc welding		100 – 400	10
Gas tungsten arc welding		400 – 800	11
Plasma arc cutting	(light)	Less than 300	8
Plasma arc cutting	(medium)	300 – 400	9
Plasma arc cutting	(heavy)	400 -800	10
Torch blazing			3
Torch soldering			2
Carbon arc welding			14
Gas welding			5 – 6
Oxygen cutting			3 - 5

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Health, Safety, and Environment WELDING LENS SELECTION

Attachment 29-T1

Operations	Electrode Size 1/32 inch	Arc Current	Minimum Protective Shade
Shielded metal arc welding (SMAW)	Less than 3	Less than 60	7
SMAW	3-5	60 – 160	8
SMAW	5 – 8	160 – 250	10
SMAW	More than 8	250 – 550	11
Gas metal arc welding and flux cored arc welding		Less than 60	7
Gas metal arc welding and flux cored arc welding		60 - 160	10
Gas metal arc welding and flux cored arc welding		160 – 250	10
Gas metal arc welding and flux cored arc welding		250 - 500	10
Gas tungsten arc welding		Less than 50	8
Gas tungsten arc welding		50 – 150	8
Gas tungsten arc welding		150 - 500	10
Air carbon arc cutting	(light)	Less than 500	10
Air carbon arc cutting	(heavy)	500 - 1000	11
Gas tungsten arc welding		Less than 20	8
Gas tungsten arc welding		20 – 100	8
Gas tungsten arc welding		100 – 400	10
Gas tungsten arc welding		400 – 800	11
Plasma arc cutting	(light)	Less than 300	8
Plasma arc cutting	(medium)	300 – 400	9
Plasma arc cutting	(heavy)	400 -800	10
Torch blazing			3
Torch soldering			2
Carbon arc welding			14
Gas welding			5 – 6
Oxygen cutting			3 - 5

URS SAFETY MANAGEMENT STANDARD Work Zone Traffic Control

1. Applicability

This procedure applies to URS field operations involving work performed on roads, highways, and similar areas where motor vehicles may be a hazard.

2. Purpose and Scope

This procedure is intended to protect personnel from the hazards associated with work performed on or next to highways and roads.

3. Implementation

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

- A. Review the project in the planning phase to determine if any work will be performed on or adjacent to any road that will disrupt normal traffic flow.
- B. Hire a qualified contractor or have an in house Competent Person devise a traffic control plan based on the work to be performed.
 - Competent persons are those who are knowledgeable about the fundamental principles of temporary traffic control and the work activities to be performed.
 - 2. Traffic control plans will be designed to meet requirements as set in the <u>Manual on Uniform Traffic Control Devices (MUTCD)</u> as well as those rules set by state, county and cities in which work is performed.
 - 3. Require that the plan is commensurate with the complexity of the project.
- C. Submit the traffic control plan to the road authority for approval.
 - 1. Submissions will be made to the state department of transportation or highways if state or federal highways are impacted as well.
 - 2. Local county representatives.
 - 3. Local city representatives, if within city limits.

URS SAFETY MANAGEMENT STANDARD Work Zone Traffic Control

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- 4. For U.K. operations, submittal is to be made to County Council or local authority.
- D. Decide whether to have qualified in house personnel or contract personnel implement the traffic control plan in the field.
 - 1. Certified flaggers may set up work zones.

Flaggers must attend an eight-hour work zone traffic control course as taught by an ATSSA certified instructor (or equivalent).

- 2. Obtain appropriate traffic control equipment as described in the MUTCD.
- 3. For U.K. operations, all operative must be trained in accordance with 'New Road and Street Works' Act.
- E. Execute the traffic control plan developed for the job site. Require all personnel who work on/or adjacent to the roadway to wear bright orange, strong yellow-green or fluorescent versions of these colors of approved work zone clothing, including:
 - 1. Vests, at a minimum.
 - 2. Coveralls, if desired.
 - 3. Rainwear or other apparel as needed.
- F. Require a Competent Person who is certified as a Worksite Traffic Supervisor supervises flaggers at least once a day.
- G. Develop a plan for the periodic inspection and maintenance of the Traffic Control Zone utilizing <u>Attachment 32-1</u>.

5. Documentation Summary

Records required in the Project Safety File:

- A. Copies of traffic control plans used on site.
- B. Training certificates for URS flaggers and Competent Persons.
- C. Qualifications of contracted flaggers and Competent Persons.
- D. Inspection records.

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URS SAFETY MANAGEMENT STANDARD Work Zone Traffic Control

6. Resources

- A. Part VI of the Manual on Uniform Traffic Control Devices (MUTCD)
- B. American Traffic Safety Services Association
- C. ATTSA Flagger Train the Trainer Program
- D. U.K. 'New Road and Street Works' Act
- E. <u>Australian Standards HB81.1-2003</u> Field Guide for Traffic Controls at Work on Roads
- F. <u>Australian Standards AS1742.3-2002</u> Manual of Uniform Traffic Control Devices
- G. <u>Australian Standards HB69.13-1995</u>. Guide to Traffic Engineering Practice Pedestrian
- I. Attachment 32-1 Traffic Control Inspection Checklist



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Health, Safety, and Environment

TRAFFIC CONTROL INSPECTION CHECKLIST

Attachment 32-1

Pro	oject Name:				
Pro	oject Number:				
	Item		Yes	No	How Many?
1.	Are any devices missing?				1
	Do any devices need repair?				
	Were all replaced or repaired?				1.1.
2.	Are any lights (flashers, etc.) not functioning?				
	Were they all replaced or repaired?				4
3.	Are any devices improperly placed?				
	Were all positions corrected?				
4.	Do any devices need cleaning?				
	Were all devices cleaned?				
Ad	ditional Comments:				
					
<u></u>					
The	e above check was completed by:				
Dat	e:	Time:			

URS SAFETY MANAGEMENT STANDARD Respiratory Protection

1. Applicability

This program defines responsibilities and procedures and is applicable to operations of URS Corporation and its subsidiary companies that may require the use of respiratory protection including Immediately Dangerous to Life and Health (IDLH) and emergency conditions. This program also addresses the voluntary use of respirators.

2. Purpose and Scope

The purpose of this procedure is to protect those employees performing operations for which exposures can not be controlled by use of conventional engineering or administrative controls and prior to establishing a negative air exposure assessment, and to require that respiratory protective equipment is selected, used, maintained, and stored in accordance with acceptable practices.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure.

Program Administration - URS Vice President HSE is responsible for the development and annual review of this program.

Regional or SBU HSE Managers are responsible to:

- Assist responsible employees in the implementation of the program.
- Assessing local compliance with the program.

4. Requirements

- A. Determine if respirators are needed or going to be used for hazardous jobs before assigning that job to an employee.
 - If the determination is that a potential for respiratory hazards exists with any portion of that job activity then, complete <u>Attachment 42-1</u>.
 - 2. Contact a HSE Manager if any of the questions in <u>Attachment 42-1</u> are checked "yes."

URS SAFETY MANAGEMENT STANDARD Respiratory Protection

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- 3. Follow instructions in <u>Attachment 42-2</u> for employees who wish to voluntarily use dust masks.
- 4. Follow all the requirements of this procedure for employees who wish to voluntarily use tight-fitting (e.g., air purifying) respirators.
- 5. Required respirators will be paid for by URS and will be provided without cost to the employee.
- B. Select the proper respirator for the job.
 - For those jobs identified in <u>Attachment 42-1</u>, contact a HSE Manager for assistance in respirator selection.
 - 2. Contact a HSE Manager for follow up if there are any problems implementing the recommendations made.
- C. Require employees who will use respirators to be medically qualified before fit testing and assigning them a respirator.
 - 1. For program details, refer to <u>SMS 24</u>, Medical Screening and Surveillance.
 - 2. Require that employees have a current and accurate Medical Surveillance form (<u>Attachment 24-2</u>).
 - 3. Obtain a copy of the employee's Health Status Medical Report from the Office Health and Safety Representative. The consulting occupational physician of the medical service provider following each work related examination issues the Health Status Medical Report. Employees cannot be assigned respirators unless they are medically cleared for respirator use.
- D. Require respirator users to receive appropriate training.
 - 1. All respirator users must be trained:
 - a. Before they are assigned a respirator.
 - b. Annually thereafter.
 - c. Whenever a new hazard or job is introduced.
 - d. Whenever employees fail to demonstrate proper use or knowledge.

- 2. Training must address, at a minimum, the following:
 - a. Why the respirator is necessary, and what conditions can make the respirator ineffective.
 - b. What the limitations and capabilities of the respirators are.
 - c. How to use respirators effectively in emergency situations.
 - d. How to inspect, put on and remove, and check the seals of the respirator.
 - e. What the respirator maintenance and storage procedures are.
 - f. How to recognize medical signs and symptoms that may limit or prevent effective use of the respirator.
- E. Require respirator users to be fit tested.
 - Any employee who has been assigned a reusable respirator must be fit tested on an annual basis (no more than one year may elapse between fit tests), or when the employee is assigned a respirator of a different make, type or size from that previously tested.
 - 2. Qualitative or quantitative fit testing can be performed by contract or in house personnel.
 - 3. Obtain a signed written copy of the fit test results. The fit test results should include:
 - a. Employee's name and social security number.
 - b. Respirator brand, model and size fitted for.
 - c. Date fit tested.
 - d. Method of fit testing used.
 - e. Name and signature of fit tester.
 - f. Statement that fit test protocol met the requirements of 29 CFR 1910.134.
 - g. Manufacturer and serial number of fit testing apparatus.

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A qualitative fit test results form is available at <u>Attachment 42-5</u>. Documentation of quantitative fit tests should follow the recommendation of the manufacturer of the fit test equipment.

- F. Provide qualified employees with respirator(s) and adequate amounts of parts and cartridges.
 - 1. Assign employees whose duties require respirators their own respirator for which they have been fit tested.
 - Provide special eyeglass inserts designed for the respirator if an employee must wear eyeglasses with a full facepiece respirator. Contact lenses may be worn when wearing a full facepiece respirator.
- G. Require respirators to be used properly.
 - 1. Prohibit facial hair where the respirator-sealing surface meets the wearer's face.
 - 2. Require employees to perform a positive and negative fit check every time the respirator is put on.
 - 3. Employees will leave the area where respirators are being used:
 - a. Before removing the facepiece for any reason.
 - b. To change cartridges.
 - c. If any of the following is detected:
 - 1. Vapor or gas breakthrough.
 - 2. Leakage around the facepiece.
 - 3. Changes in breathing resistance.
 - Use cartridges with End of Service Life Indicators or determine the respirator cartridge change out schedule. See <u>Attachment 42-4</u> for Guidance.
- H. Require respirators to be cleaned and stored properly.
 - 1. Clean and disinfect respirators after each use.

- 2. Store respirators in a plastic bag or case and in a clean location.
- 3. Inspect respirators before use and after each cleaning.
- I. Address issues associated with special use respirators self-contained breathing apparatus; air supply respirators; emergency use respirators).
 - 1. Self Contained Breathing Apparatus

Inspect self-contained breathing apparatus and other emergency use respirators monthly and after each use in accordance with manufacturer's instructions.

- 2. Air Supplied Respirators
 - a. Air used for atmosphere-supplying respirators must meet or exceed the requirements for Type 1 - Grade D breathing air. Never use oxygen.
 - 1. A certificate of analysis must accompany bottled air.
 - 2. Compressors used to supply breathing air must:
 - i. Prevent entry of contaminated air into the air supply.
 - ii. Minimize moisture content.
 - iii. Have suitable in-line sorbent beds and filter to provide appropriate air quality.
 - iv. Have a high carbon monoxide alarm that sounds at 10 ppm.
 - b. Couplings on air hose lines must be incompatible with other gas systems.
- J. Require follow up training and medical surveillance to be provided as directed.
 - 1. Provide follow-up physical examinations as directed by the <u>SMS</u> 24-3, <u>Medical Screening and Surveillance Exam Protocol table</u>.
 - Provide follow-up physicals as directed by the Regional Medical Surveillance Administrator.

- 3. Provide annual refresher training.
- 4. Provide annual fit testing.

5. Documentation Summary

A. Laboratory

- 1. File these records in the Laboratory Safety Filing System
 - a. Completed forms:
 - "Identifying When A Respirator Is Needed" -Attachment 42-1; and,
 - 2. "Respirator Standard Operating Procedure" Attachment 42-3.
 - b. Employee Health Status Medical Report includes clearance for respirator use.
 - c. Employee Fit Test Records; and,
 - d. Employee Respirator Training Records.
- 2. Send a copy of the following records to the Regional Health and Safety Manager:
 - a. Completed "Voluntary Use of Respirators" form <u>Attachment</u> 42-2.
 - b. Employee Fit Test Records.
 - c. Employee Respirator Training Records.

B. Field

- 1. File these records in the Project Health and Safety File:
 - a. Completed forms:
 - 1. "Identifying When A Respirator Is Needed" Attachment 42-1; and,

- 2. "Respirator Standard Operating Procedure" Attachment 42-3.
- 3. Employee Health Status Medical Report includes clearance for respirator use.;
- 4. Employee Fit Test Records; and,
- 5. Employee Respirator Training Records.
- 2. Send a copy of the following records to the Regional Health and Safety Manager:
 - a. Completed "Voluntary Use of Respirators" form Attachment 42-2.
 - b. Employee Fit Test Records; and,
 - c. Employee Respirator Training Records.

6. Resources

- A. U.S. OSHA Standard Respiratory Protection 29 CFR 1910.134
- B. U.S OSHA Technical Links Respiratory Protection
- C. ANSI Z88.6, Respirator Use Physical Qualifications for Personnel, Current Revision
- D. ANSI Z88.2, Respiratory Protection, Current Revision
- E. 3M Cartridge Service Life Interactive Program
- F. Australian Standards AS/N25 1715 1994. Selection, Use, and Maintenance of Respiratory Protection Devices
- G. Australian Standards HB9-1994. Occupational Personal Protection
- H. <u>AlHA</u>, The Occupational Environment Its Evaluation and Control

 The following documents are PDF files which must be read with Adobe Reader:
- I. NIOSH Respirator Decision Logic

- J. NIOSH Guide to Industrial Respiratory Protection
- K. Attachment 42-1 Identifying When a Respirator is Needed
- L. Attachment 42-2 Voluntary Use of Respirators
- M. <u>Attachment 42-3</u> Respirator Standard Operating Procedure
- N. <u>Attachment 42-4</u> Respiratory Cartridge Change Schedule
- O. Attachment 42-5 Fit Test Results Form

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P. Medical Screening and Surveillance Program - SMS 24



Health and Safety Program

IDENTIFYING WHEN A RESPIRATOR IS NEEDED

Attachment 42-1

Rev 1: October 2006

Site Location:		Date:	
Name of Person Perf	forming Evaluation:		
Project:			

Answer the questions below for the jobs you are to perform on site. If a 'yes' response is checked, consult with a Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager to determine:

- If a respirator is truly needed for the job, as well as,

	Yes	No	7×30 4	Burat agenta	1, W 🐧		тиць ,
Material Used or Process to be Performed	Respirator may be needed				Notes		
Abrasive Blasting							
 Abrasive blasting (with any type of grit or material) will be performed 							
 Employee will fill abrasive blasting pots or perform clean-up activities 							
 Employee will be ion a contained area where abrasive blasting is taking place 					•	_	
Acids							
 Liquid or powder acids will be used in a situation where acid vapors, mists or dust may be breathed. 							
Adhesives							
 Aerosols-propelled adhesives are to be used in areas where there is no or insufficient local exhaust ventilation 							
• Two-part adhesives (mix part one with two, let set then use) are to be used in areas where there is limited ventilation.		;]					
Alkalis/Bases/Caustics							
 Powdered alkalis will be used in a situation where an airborne dust may be breathed. 							15
Asbestos Abatement							
• Asbestos will be removed, repaired or sampled							
 Employees will be inspecting or overseeing areas where asbestos will be removed or disturbed. 						·	
Cleaning Compounds							
 Degreasers or carbon removers will be used in areas where local exhaust ventilation is not provided. 							
		<u> </u>					



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Health and Safety Program

IDENTIFYING WHEN A RESPIRATOR IS NEEDED

Attachment 42-1

Rev 1: October 2006

Material Used or Process to be Performed	Yes Respirator may be needed	No	N	otes
 Aerosol propelled cleaning compounds will be used in areas where there is no local exhaust ventilation. 				
 Degreasers or carbon removers will be used in voids, tanks, or other confined spaces. 				
Corrosion Preventive Compounds				
 Corrosion prevention compounds, including chemical conversion compounds and corrosion inhibitors, will be used in areas where there is no local exhaust ventilation. 				
Detergents/Soaps				
 Ammonia based detergents will be used in large quantity (more than five gallons) in areas where local exhaust ventilation cannot be provided. 				
 Large quantities (5 or 55 gallon containers) of high pH powder detergent/soap will be used in a situation where dust may be breathed. 				
Fuels (including regular or unleaded gasoline, kerosene, diesel fuel, JP-5)				
 Employees will be inside unventilated fuel cells or other confined spaces containing fuels. 				
Grinding, Cutting, Sanding				
 Cutting, grinding or sanding surfaces that have coatings containing lead, cadmium, chromium, zinc or beryllium. 				
 Cutting, grinding or sanding surfaces that are concrete or glass without use of ventilation or water. 				
Hazardous Waste Sites				
Employees will be performing tasks on a hazardous waste site that requires the use of respirator (as indicated in the site safety & health plan).				
Employees will be performing site assessments on potential hazardous waste sites.				
Hydraulic Fluids (including petroleum-based fluids, synthetic fire-resistant fluids, and water based fire resistant fluids)				
Hydraulic fluids and the vapors generated will not be exhausted using local exhaust ventilation.				
Synthetic fire-resistant fluids or water-based fire- resistant fluids will be used in an area where the				



Health and Safety Program

IDENTIFYING WHEN A RESPIRATOR IS NEEDED

Attachment 42-1

Rev 1: October 2006

	Yes	No	
Material Used or Process to be Performed	Respirator may be needed		Notes
air is contaminated with visible mist or spray from hydraulic fluids.	nesoed	Maday . [1 hs	
Inspection Penetrants (including Flouro-finder, water indicating pastes, and penetrant removers)			
 An aerosol-propelled inspection penetrant will be used in an area where local exhaust ventilation cannot be provided, or in a situation where the solvent vapors can be breathed. 			
Lead Abatement Activities			
 Lead containing materials will be disturbed, removed or sampled. 			
 Employees will be inspecting or overseeing areas were lead will be removed or disturbed. 			
Lubricants/Oils			
 Aerosol lubricants/oils will be sprayed with no immediate exhaust ventilation. 			
 Oxidizers (materials that give off oxygen including chlorine laundry bleach, calcium hypochlorite, calcium oxide, oxygen candles, lithium hydroxide, hydrogen peroxide, and sodium dichromate) Oxidizers containing organic chlorine will be used in a situation where the dusts/vapors may be 			
breathed. • Powdered oxidizers will be used in a situation			
where airborne dust may be breathed.			
Paint Materials (including paints, primers, thinners, enamels, lacquers, strippers, coatings and varnishes)			
 Paint materials will be spray applied in areas where there is no local exhaust ventilation. 			
 Two part (mix part a with part b, let set, then apply) polyurethane or epoxy polyamide paints will be brush or spray applied. 			
 Paints containing lead, chromium, cadmium, beryllium, and zinc (refer to the MSDS). 			
 Paint materials will be applied in confined spaces. 			
Solvents (including hydrocarbon solvents such as acetone, methyl ethyl ketone, toluene, xylene, and alcohols, as well as mixed solutions like antifreeze, heat transfer fluid, turpene, dope and naphtha thinner)			
• Local exhaust ventilation will not be provided and			



Health and Safety Program

IDENTIFYING WHEN A RESPIRATOR IS NEEDED

Attachment 42-1

Rev 1: October 2006

	Yes	No	
Material Used or Process to be Performed	Respirator may be needed	1 (2007) 2 (2007) 2 (2007)	Notes
work will involve breathing solvent vapors			
Solvents will be used within confined spaces			
Solvents will be applied using aerosols.			
Thermal Insulation (including asbestos & non-asbestos materials like pipe lagging, fiberglass insulation, boiler insulation, packing materials and floor/ceiling tiles)			
Insulation will be disturbed, removed or sampled			
Water Treatment Chemicals (includes corrosive chemicals such as tri-sodium phosphate, hardness buffer, tritrating solution, morpholine, caustic soda, citric acid and nitric acid as well as toxic chemicals such as mercuric nitrate, hydrazine, EDTA and sodium nitrate)			
Morpholine, EDTA, or harness buffer/titrating solution is to be used in poorly ventilated spaces.			
Powdered water treatment chemicals will be used in a situation where chemical dusts may be breathed			
Welding/Brazing			
Welding will be performed in confined spaces			
Welding galvanized metal or stainless steel			
Brazing with cadmium or lead			
For Any of the Above Listed Activities			
An employee will be in the immediate area – within 10 feet of the job or operation, or			
Employee will be inside confined space where activities are taking place, or			
Employee will be inside a "controlled area" such as found in asbestos abatement, lead abatement, radiation control area, or a hazardous waste site.			
Materials Safety Data Sheets	}		
For any chemical product used, a respirator is recommended			
Product Labels			
 For any product used, instructions indicate a respiratory should be used. 			
Standard Operating Procedures			
A Standard Operating Procedure indicates the use of a respirator.			



Health, Safety, and Environment

Attachment 42-2

VOLUNTARY USE OF RESPIRATORS

Instructions: Have the employee that is opting to use a respirator for nonoverexposure conditions read this page, and then sign on the bottom of the page. Maintain a copy in the employee's training file.

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for employees. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the employee. Sometimes employees may wear respirators to avoid exposures to hazards, even if the amount of the hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your own voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not pose a hazard.

You should do the following

- 1. Read and follow all instructions provided by the manufacture on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
- 2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety & Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how it will protect you.
- 3. Do not wear your respirator into atmospheres containing contaminants for which your
- 4. Respirator is not designed to protect you against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, fumes, smoke or very small solid particles.
- 5. Keep track of your respirator so that you do not mistakenly use someone else's respirator.
- 6. If you have any health conditions (asthma; high blood pressure; emphysema; heart disease) that could be aggravated by using a respirator, you should check with your doctor before using one.

I have read and understand this information on:	Date:
Employee's Name (Please Print)	
	
Employee's Signature	

URS

Health, Safety, and Environment

RESPIRATOR STANDARD OPERATING PROCEDURE

Attachment 42-3

Job Task Reviewed:	 	
Date Reviewed	 	
Task Review by:	 	

ADMINISTRATIVE PROCEDURES

- 1. All respirator users must be medically qualified to use respirators.
- 2. Respirator users must be trained annually in respirator use and fit tested annually.
- 3. Only the person to whom it was issued will use respirator.
- 4. Persons using glasses who are required to use a full-face respirator may use contact lenses or eyeglass inserts designed for the respirator.

GUIDANCE FOR SELECTION OF RESPIRATOR & CARTRIDGES/FILTERS

1.	Respirators are currently being issued and used for the following job activity:
2.	The respirator will be equipped with the following cartridges/filters:
3.	Filters are to be changed when the breathing resistance increases.
4.	Cartridges are to be changed or when the contaminant you are protecting yourself from can be smelled or tasted.

FIT TESTING & FIT CHECKING

- 1. Fit testing is required annually. To arrange for fit testing, call your local safety representative.
- 2. Respirator users will "fit check" the respirator every time the respirator is put on:

Negative Check – cover filters/cartridges with palms of hands and breath in, leakage should not be detected around the face seal of the respirator. Do not use if leakage is detected

Positive Check – cover the exhalation valve cover with palm of hand and blow out slightly, leakage should not be detected around the respirator seal.

For Air Supply Respirators – kink or close off air supply hose and breath in, leakage should not be detected around the face seal of the respirator.

CLEANING & MAINTENANCE OF RESPIRATOR

- 1. Clean and disinfect respirator after every use.
- 2. Inspect respirator after every day in use to ensure parts are not missing. Replace missing parts from stock supply.
- 3. Store clean respirator in labeled plastic bag out of direct sunlight.
- 4. Do not alter respirator in any way.



Health, Safety, and Environment

Attachment 42-4

RESPIRATOR CARTRIDGE CHANGE SCHEDULE

A cartridge change schedule must be developed for cartridges or canisters used with air purifying respirators that do not have an End of Service Life Indicator (ESLI). The purpose of this is to prevent contaminants from breaking through the respirator's sorbent cartridge(s), and thereby over-exposing employees. NIOSH has approved ESLIs for only four cartridges or canisters (mercury vapor, carbon monoxide, ethylene oxide, and hydrogen sulfide). Historically we have relied on the warning properties (odor, irritation) of a contaminant to dictate cartridge change. OSHA no longer allows this as the sole basis for changing respirator cartridges. In developing a change schedule the following factors should be considered:

Contaminants.

Concentration.

Frequency of use (continuously or intermittently throughout the shift).

Temperature and humidity.

Work rate.

The presence of potentially interfering chemicals.

The worst-case conditions should be assumed to avoid early breakthrough. This must be documented in the project health and safety plan or, in the cases of office or labs, in the site specific Respiratory Protection Program.

Sources of Help

Manufacturers

3M has an interactive "Cartridge Service Life" program that can be downloaded for free:

http://www.mmm.com/market/safety/ohes2/index.html

This program will estimate cartridge service life for 3M products against many contaminants. The program does not evaluate the service life against mixtures (multiple contaminants). Because of the complexity in evaluating mixtures, OSHA offers the following guidance:

When the individual compounds in the mixture have similar breakthrough times (i.e., within one order of magnitude), service life of the cartridge should be established assuming the mixture stream behaves as a pure system of the most rapidly migrating component with the shortest breakthrough time (i.e., sum up the concentration of the components).

Where the individual compounds in the mixture vary by 2 odors of magnitude or greater, the service life may be based on the contaminant with the shortest breakthrough time.



Health, Safety, and Environment

Attachment 42-4

RESPIRATOR CARTRIDGE CHANGE SCHEDULE

Rule of Thumb ("The Occupational Environment" - Its Evaluation and Control)

If the chemical's boiling point is >70 C and the concentration is less than 200 pip you can expect a service life of 8 hours at a normal work rate. Service life is inversely proportional to work rate.

Reducing concentration by a factor of 10 will increase service life by a factor of 5.

Humidity above 85% will reduce service life by 50 %.

OSHA Interpretation

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The OSHA inspection procedures for the respiratory protection standard specifies that where contaminant migration is possible, respirator cartridges/canisters should be changed after each work shift where exposure occurs unless there is objective data to the contrary (description studies) showing the performance in the conditions and schedule of use/non-use found in the workplace.

Qualitative Respiratory Fit Test Record Attachment 42-5

Name:		Employee Number: Last Medical Exam:				
Company/Office:						
Fit Test Date:		Corrective Lenses Needed:	Yes □	No □		
Briefed on fundamental princi cleaning, maintenance and sto		otection, use, selection, inspection	on Yes □	No □		
Isoamyl acetate odor recogniti	on		Yes □	No 🗆		
	RESPIRATOR 1	RESPIRATOR 2	RESPII	RATOR 3		
Equipment Type						
Manufacturer's Name				. <u>.</u>		
Model						
Size			•			
Facepiece Composition (Rubber/Silicone)						
TEST PERFORMED	RESPIRATOR 1	RESPIRATOR 2	<u>RESPIR</u>	ATOR 3		
Negative Pressure Test:	P□ F□	PD FD	P □	F□		
Positive Pressure Test:	P 🗆 F 🗆	P□ F□	P □	F□		
Isoamyl Acetate Vapor Test:	PO FO	P□ F□	P □	F□		
Irritant Smoke Test:	P□ F□	P□ F□	P□	F 🗆		
This qualitative fit test prot CFR 1910.134, Appendix A		oted from OSHA Respiratory	Protection	Standard		
xaminer's Name (Please Print)	Examine	r's Signature l	Date			
Employee's Signature	Date					



URS SAFETY MANAGEMENT STANDARD Personal Monitoring (Industrial Hygiene)

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies where employees may be exposed to concentrations of hazardous air contaminants potentially exceeding permissible limits.

2. Purpose and Scope

This standard is intended to assist and provide guidance to URS personnel that need to conduct personal industrial hygiene monitoring.

Personal monitoring is to be conducted under the following conditions:

- A. Where directed by a facility or site-specific health and safety plan.
- B. Where employees are exposed to known or suspected human carcinogens (e.g. beryllium, vinyl chloride, etc).
- C. Where regulations require "initial exposure assessments (e.g. lead, asbestos, methylene chloride, hexavalent chromium)." The only exception to conducting an "initial exposure assessment" where there is a regulatory requirement to do so is when similar exposure assessments have been conducted under similar site conditions within one year prior to the start of work on the current project or site.
- D. When directed by a client or required by contract.

Retain a copy of the referenced initial exposure assessment and place it in the facility or site Safety File.

2. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, Country, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure.

3. Requirements

A. Procedures for Personal Industrial Hygiene Monitoring

URS SAFETY MANAGEMENT STANDARD Personal Monitoring (Industrial Hygiene)

- Collect samples using the applicable methodologies established by either NIOSH (NIOSH Manual of Analytical Methods), OSHA (OSHA 10), or applicable guidelines for host country.
- 2. Require the selected laboratory to utilize the applicable analytical methodologies and document quality control procedures.
- 3. Ensure equipment is maintained, services, and calibrated in accordance with manufacturers recommendations.
- 4. Document personal monitoring activities using a URS Industrial Hygiene Monitoring Form (<u>Attachment 43-1</u>) and require that all Chain of Custody forms be properly completed.
- 5. Ensure workers are being protected (e.g. engineering controls, respiratory protection, PPE) during the monitoring phase.

 Determine whether medical surveillance is required.

B. Evaluation of Personal Monitoring Results

- Require that a Certified Industrial Hygienist (CIH) approved by a Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager evaluate the analytical results.
- 2. Obtain a written evaluation report from the URS Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager. If exposures exceed the Action Level and/or Permissible Exposure Limit for the air contaminant(s) of concern, a verbal report is to be made to the senior facility, project, or site Manager immediately, and the evaluation report will include required corrective actions.
- 3. Evaluation reports are to be completed within five working days of the receipt of the analytical results.

C. Communication of Sample Results and Evaluation

- 1. Provide copies of the evaluation report to the employee(s) monitored and to employees working in the area for which the exposures could be representative, within 5 days of receipt of lab results.
- 2. Provide a copy of the evaluation report and monitoring data to the manager directing activities of the facility or site for filing purposes.

SMS 043 Issue Date: June 1999

Revision 1: October 2007

URS SAFETY MANAGEMENT STANDARD Personal Monitoring (Industrial Hygiene)

D. Corrective Actions

Implement required corrective actions immediately. If workers are being exposed above the PEL, respiratory protection should be worn in accordance with the URS Respiratory Protection program (<u>SMS 042</u>). Engineering controls should be used to reduce exposures to the extent possible.

4. Documentation Summary

Maintain in the facility or site Safety File:

- A. Calibration data
- B. Completed IH Monitoring Form(s)
- C. Evaluation Report with sample results
- D. Relevant prior initial exposure assessments
- E. Provide to affected employees:

Evaluation Report with sample results

5. Resources

- A. OSHA Analytical Methods
- B. OSHA Chemical Sampling Information
- C. <u>American Industrial Hygiene Association</u>, <u>The Occupational Environment</u>, <u>Its Evaluation and Control</u>.
- D. <u>American Conference of Governmental Industrial Hygienists</u>. <u>Air Sampling Instruments for Evaluation of Atmospheric Contaminants</u>.
- E. U.K. 'Control of Substances Hazardous to Health'
- F. NIOSH Analytical Methods
- G. Attachment 43-1 IH Monitoring Form
- H. Specific Chemical Hazards SMS 050



Health, Safety, and Environment

Attachment 43-1

INDUSTRIAL HYGIENE MONITORING FORM

Project Information:			
	Name		
	Date		
Project Nu	umber		
Project Name and Lo	cation		
Weather Cond	ditions		
Sample Type	Personal Area	URS Control Number:	
Sample Location:		Pump Manufacturer:	
Sample Media:		Pump Model Number:	
Lot Number:		Pump Serial Number:	
Contaminant Sampled:		Analytical Method:	
Sample Information:			.
Sample I.D. Sample Number Location	Pump Number Flow Rate	Start Time Stop Time	Elapsed Volume Time (mins) (liters)
PPE Used			
Corresponding Photogr	raphs		
	umber, Roll posure No.	Description	

1. Applicability

This program applies to job activities performed primarily in outdoor environments.

2. Purpose and Scope

The primary goal of this program is to eliminate or reduce illnesses and injuries transmitted by plants, insects, animals, and pathogenic agents. Although there are many animals and insects that are potentially harmful to humans (i.e. bees, spiders, bears, and rodents), this safety management standard focuses on six common biological hazards: ticks, poison plants, mosquitoes, snakes, Valley Fever, and water-borne pathogenic agents. See <u>SMS 51</u> concerning Bloodborne Pathogens.

3. Implementation

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The Project Manager, with support from the URS HS&E Regional Managers and Occupational Health Manager, will be responsible for implementation of this program.

4. Requirements

A. Ticks

1. Precautionary Measures

Background information: Ticks do not jump, crawl, or fall onto a person. They are picked up when clothing or hair brushes a leaf or other object the tick is on. Ticks are generally found within three feet of the ground. Once picked up, they will crawl until they find a likely site to feed. Often they will find a spot at the back of the knee, near the hairline, behind the ears, or at pressure points where clothing presses against the skin (underwear elastic, belts, neckline). The best way to prevent tick borne diseases is not to be bitten by a tick. Ticks can carry a number of diseases including:

Lyme Disease is an infection caused by the corkscrew-shaped bacteria *Borrelia burgdorferi* that is transmitted by the bite of deer tick (ixodes) and western black-legged ticks. The disease occurs in the forested areas of North America, Europe, and Asia. Symptoms which occur 3-30 days following a tick bite include: a spreading 'bulls-eye' rash, fever, fatigue, headache, and joint and muscle aches. Prompt treatment with antibiotics is essential in order to prevent more serious complications that may occur if left untreated.

Rocky Mountain Spotted Fever is an infection caused by the bacteria *Rickettsia rickettsii*. The disease occurs in North, Central, and South America. Other Rickettsia organisms cause disease worldwide (Mediterranean, Japan, Africa, North Asia). Symptoms which occur 2-6 days following a tick bite include: fever, nausea, vomiting, diarrhea, rash, muscle and joint pain. The disease is treated with antibiotics.

<u>Babesiosis</u> is caused by hemoprotozoan parasites of the genus <u>Babesia</u>. It is transmitted by the ixodid tick. The geographic distribution is worldwide. Symptoms include fever, chills, fatigue, muscle aches, and an enlarged spleen and liver. The disease is treated with anti-protozoan drugs.

Ehrlichiosis is caused by several bacteria of the genus *Ehrlichiae*. The geographic distribution is global, primarily in temperate regions. Symptoms which occur 5-10 days following a tick bite include fever, headache, fatigue, muscle aches, nausea, vomiting, diarrhea, confusion, and occasionally a rash. The disease is treated with antibiotics.

a. Avoidance of tick habitats

Whenever possible, persons should avoid entering areas that are likely to be infested with ticks, particularly in spring and summer when nymphal ticks feed. Ticks favor a moist, shaded environment, especially that provided by leaf litter and low-lying vegetation in wooded, brushy, or overgrown grassy habitat. Both deer and rodent hosts must be abundant to maintain the life cycle of the tick.

b. Personal Protective Equipment

- 1. Wear light colored clothing or white Tyvek® to allow you to see ticks that are crawling on your clothing.
- 2. Tuck your pant legs into your socks or boots, wear high rubber boots, or use tape to close the opening where they meet so that ticks cannot crawl up the inside of your pant legs.
- 3. Wear a hat, tie back long hair.
- 4. Apply repellents to discourage tick attachment. Repellents containing permethrin can be sprayed on boots and clothing and will last for several days. Repellents containing DEET (n,n-diethyl-

m-toluamide) can be applied to the skin, but will last only a few hours before reapplication is necessary. Apply according to Environmental Protection Agency guidelines to reduce the possibility of toxicity.

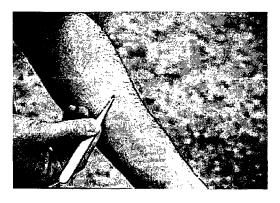
c. Tick Check

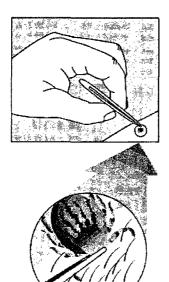
- 1. Change clothes when you return from an area where ticks may be located.
- 2. Shower to wash off any loose ticks.
- 3. Check your entire body for ticks. Use a hand held or full-length mirror to view all parts of your body.
- 4. Place clothing worn in tick infested areas into the dryer for at least 30 minutes in order to kill any ticks.

2. Tick Removal

Because it takes several hours of attachment before microorganisms are transmitted from the tick to the host, prompt removal of attached or crawling ticks is an important method of preventing disease. Remember, folklore remedies of tick removal to do not work! Methods such as the use of petroleum jelly or hot matches may actually make matters worse by irritating the tick and stimulating it to release additional saliva or regurgitate gut contents, increasing the chances of transmitting disease.

The best method to remove an attached tick is with a set of fine tipped tweezers.







- a. Use fine-tipped tweezers. When possible, avoid removing ticks with bare hands.
- b. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. If this happens, remove mouthparts with the tweezers.
- c. Do not squeeze, crush, or puncture the body of the tick because its fluids (saliva and gut contents) may contain infectious organisms.
- d. After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.
- e. Disinfect the tweezers.
- f. Save the tick for identification in case you become ill. This may help the doctor make an accurate diagnosis. Place the tick in a vial or plastic zip lock bag and put it in the freezer. Write the date of the bite on a piece of paper with a pencil and place it in the bag.

3. Medical Follow-Up

In most circumstances, medical treatment of persons who only have a tick bite is not recommended. However, individuals who are bitten by a tick

should seek medical attention if any signs and symptoms of tick borne disease develop over the weeks following the tick bite.

B. Poisonous Plants

1. Background Information

Poison ivy and poison oak plants are the most common cause of allergic contact dermatitis in North America. These poisonous plants can be a hazard for many various outdoor activities at work, home, and play. Skin contact with the oleoresins (urushiol) from these plants can cause an itchy, red, oozing, blistered rash in sensitive individuals. Oil content in the plants is highest in the spring and summer, however the plants are even hazardous in the winter when they have dropped their leaves. There are three types of exposure:

Direct contact: An initial skin exposure in necessary to "sensitize" the individual. Subsequent contact in a sensitized person will result in a rash appearing within 4 to 48 hours. Approximately 50-70 % of the population is sensitized. Poison plant dermatitis is usually characterized by areas of linear or streaked patches where branches of the plant brushed the skin.

Indirect contact: Skin exposure can happen indirectly. Clothing, shoes, tools, personal protective equipment and other items can be contaminated with the oils and maintain potency for months.

Airborne smoke contact: Never burn poison plants. Droplets of oil can be carried by smoke and enter the respiratory system causing a severe internal outbreak.

Poison plant rash is not contagious. Skin contact with blister fluid from an affected individual will not cause dermatitis in another sensitized person. Scratching the rash can only spread it to other parts of your body if the oil is still on your skin. After the oil has been washed off or absorbed by the skin, scratching will not spread the rash.

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each and are green in the summer and red in the fall. Both plants also have greenish-white flowers and berries that grow in clusters. All parts of these plants are toxic.

Poison Ivy grows as a small plant, vine, and as a shrub. Leaves always consist of three glossy leaflets.



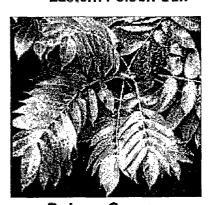
Poison Ivy

Poison Oak grows as a shrub or vine. It has three leaflets that resemble oak leaves.



Eastern Poison Oak

Poison Sumac grows as a woody shrub or small tree from 5 to 25 feet tall. It has 7 to 13 leaves that grow opposite each other with a leaflet at the tip.



Poison Sumac

1. Precautionary Measures

The best approach is to learn to identify the plants and avoid them.

Wear long pants and long sleeves, boots and gloves.

Barrier skin creams may offer some protection if applied before contact.

Avoid indirect contact from tools, clothing or other objects that have come into contact with a crushed or broken plant. Don't forget to wash contaminated clothing and clean up contaminated equipment.

If you can wash exposed skin areas within 3-5 minutes with cold running water, you may keep the urushiol from penetrating your skin. Proper washing may not be practical in remote areas, but a small wash-up kit with pre-packaged alcohol-based cleansing tissues can be effective.

2. Medical Follow-Up

Home treatment: Calamine lotion and an oatmeal (one cup to a tub full of water) bath can help relieve itching. To prevent secondary skin infection, scratching is not helpful and the finger nails should be cut to avoid damage to the skin. Over-the-counter hydrocortisone cream can decrease inflammation and itching, however read the label and use according to directions.

When to see the doctor: Severe cases may require further treatment. A physician should be seen if the rash appears infected, is on the face or other sensitive body areas, or is too extensive to be easily treated at home.

C. Mosquito Borne Diseases

1. Background Information

- a. Arboviral encephalitis is a viral illness causing inflammation of the brain and is transmitted to humans by the bite of infected mosquitoes. Globally there are several strains including: Eastern equine, Japanese, La Crosse, St. Louis, West Nile, and Western equine encephalitis. Some of the strains have a vaccine. Symptoms of infection are nonspecific and flu-like: fever, headache, and tiredness. Fortunately, only a small proportion of infected people progress to encephalitis. Treatment is supportive, antibiotics are not effective.
- b. Malaria is a serious but preventable disease spread by the bite of an infected anopheline mosquito. It is caused by four species of the parasite *Plasmodium (P. falciparum, P. vivax, P. ovale, and P malariae)*. Malaria-risk areas include primarily tropical areas of Central and South America, Africa, India, Southeast Asia, and the Middle East. Symptoms of malaria which occur 8 days to 1 year after infection

include fever, shaking chills, headache, muscle ache, tiredness, jaundice, nausea, vomiting, and diarrhea. Malaria can be cured with prescription drugs.

- c. Dengue Fever is a potentially life-threatening viral illness transmitted by the bite of the Aedes mosquito, found primarily in urban areas. The disease is found in most of tropical Asia, the Pacific Islands, Central and South America, and Africa. There are four dengue virus serotypes. Symptoms include sudden onset, high fever, severe headache, joint and muscle pain, rash, nausea and vomiting. There is no specific treatment and no vaccine.
- d. Yellow Fever is a viral disease transmitted between humans by mosquitoes. It occurs only in Africa and South America. There is a vaccine that confers immunity lasting 10 years or more. Symptoms begin 3-6 days after the mosquito bite and include fever, nausea, vomiting, headache, slow pulse, muscle aches, and restlessness. Treatment is symptomatic.

2. Precautionary Measures

Insect Repellent – Use insect repellants that contain DEET. The effect should last about 4 hours. Always use according to label directions. Use only when outdoors and wash skin after coming indoors. Do not breathe in, swallow, or get into the eyes. Do not put on wounds or broken skin.

Protective Clothing – wear long sleeved shirts and long pants, especially from dusk to dawn. Or avoid going outdoors during these hours.

Mosquito netting – Travelers who will not be staying in well-screened or air conditioned rooms should use a pyrethroid containing flying insect spray in living and sleeping areas during evening and nighttime hours. Sleep under mosquito netting (bed nets) that have been sprayed with permethrin.

Malaria prophylaxis medications may be prescribed, however they do not provide complete protection. The type of medication given depends on the area of travel.

D. Poisonous Snakes

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1. Background Information

No single characteristic distinguishes a poisonous snake from a harmless one except the presence of poison fangs and glands. Only in dead specimens can you determine the presence of these fangs and glands without danger. Most poisonous snakes have both neurotoxic and hemotoxic venom, however, one type is dominant and the other is weak.

- a. Hemotoxic venom. The folded-fang snakes (fangs can raise to an erect position) have venoms that affect the circulatory system, destroying blood cells, damaging skin tissues, and causing internal hemorrhaging.
- b. Neurotoxic venom. The fixed-fang snakes (permanently erect fangs) have venoms that affect the nervous system, making the victim unable to breathe.
- c. Poisonous snakes in the Americas: copperhead, coral snake, cottonmouth, and rattlesnake.
- d. Poisonous snakes in Europe: adder, viper.
- e. Poisonous snakes of Africa and Asia: viper, cobra, adder, green mamba.
- f. Poisonous snakes in Australia: copperhead, adder, taipan, tiger snake.

2. Precautionary Measures

Bites occur when you don't hear or see the snake, when you step on them, or when you walk too close to them. Follow these simple rules to reduce the chance of accidental snakebite:

Don't put your hands into dark places, such as rock crevices, heavy brush, or hollow logs, without first investigating.

Don't step over a fallen tree. Step on the log and look to see if there is a snake resting on the other side.

Don't walk through heavy brush or tall grass without looking down. Look where you are walking.

successful, personnel should be alert to signs and symptoms of possible pathogenic organisms and seek prompt medical evaluation if illness develops or is suspected.

5. Documentation Summary

Complete and distribute a URS Incident Report form <u>49-1</u> for all work-related biological exposure incidents.

6. Resources

- A. Centers for Disease Control http://www.cdc.gov
- B. U. S. Occupational Safety and Health Administration http://www.osha.gov
- C. U.S. Food and Drug Administration
 Treating and Preventing Venomous Snake Bites
 http://www.fda.gov/fdac/features/995_snakes.html

URS SAFETY MANAGEMENT STANDARD Hazardous Materials/Dangerous Goods Shipping

1. Applicability

Office and field operations that ship hazardous materials (HazMat) must follow this Hazardous Material/Dangerous Goods Shipping Program.

Hazardous materials may include, but are not limited to, compressed gases, nuclear density meters, laboratory reagents, field samples, hazardous wastes, and materials used for bench scale and pilot plant operations.

The air shipment of environmental samples represents the largest percentage of hazardous materials/dangerous goods shipped by URS. While most environmental samples (both water and soil) do not meet the definition of hazardous, extreme care must be taken to properly classify materials.

As the more stringent requirements apply to air shipments, ground shipment (e.g., use of a lab courier service) should first be considered for hazardous materials shipping.

2. Purpose and Scope

This program was designed to provide a framework for compliance with the requirements of the U.S. Department of Transportation (DOT) 49 CFR and the International Air Transportation Association (IATA) for shipping hazardous materials/dangerous goods by land or air.

3. Implementation

Office Locations - The Office Manager is responsible for implementing this program at company locations/facilities.

Field Activities - The Project Manager is responsible for compliance and implementation of this program at project sites.

4. Requirements

A. Staffing

Each project or location must ensure that awareness and function specific trained individuals are involved in the process of preparing hazardous materials for shipment.

Each location where HazMat shipping occurs or where HazMat employees are assigned must identify a local or regional Shipping Specialist.

Issue Date: August 1999 Revision 2: March 2004

URS SAFETY MANAGEMENT STANDARD Hazardous Materials/Dangerous Goods Shipping

URS maintains a hazardous materials/dangerous goods **shipping hotline** to provide answers to specific shipping questions.

800-381-0664 in Canada and U.S;

919-461-1227 for other countries.

B. General Procedures

- 1. Select the best way to ship the HazMat item based on the quantity, hazard(s), and mode of transportation (e.g., air, land, water).
- 2. Ensure package contents are compatible.
- 3. Package, mark, and label according to applicable regulations.
- 4. Complete the bill of lading or shipper's declaration for dangerous goods according to applicable regulations.
- 5. Follow hazard communication requirements:
 - a. Send a copy of the appropriate Emergency Response Guidebook page or material safety data sheet (MSDS) with each shipment.
 - b. Include the 24-hour emergency response phone number (CHEMTREC 800-424-9300 domestic, 703-527-3887 international) on the shipping paperwork.

C. Placarding Requirements

- 1. "Limited quantities" are excepted from placarding.
- 2. URS staff will not transport quantities of material requiring a placard.

D. Training

- Require employees who package, prepare paperwork, load and/or unload, and transport hazardous materials be trained to the appropriate level of activity:
 - a. Training is required prior to performing HazMat shipping activities.

Issue Date: August 1999 Revision 2: March 2004

URS SAFETY MANAGEMENT STANDARD Hazardous Materials/Dangerous Goods Shipping

- b. Training is required when regulatory changes impact current procedures and every 2 years.
- c. General awareness training is required for everyone who is involved in HazMat shipping. An on-line hazardous materials awareness course is available via the training section of the soURSe and is included in HAZWOPER refresher training. This training includes:
 - 1. Recognizing hazardous materials
 - 2. Penalties for not complying
 - 3. Basic regulatory requirements
- d. Regional or local shipping specialists must complete a 2-day hazardous materials/dangerous goods shipping course conducted by URS or complete an outside equivalent course.
- e. Driver's may be exempt from function specific training if the DOT's Materials of Trade (MOT) exception applies to the shipment. (See <u>Attachment 48-1</u> for information on this exception).

E. Special Requirements

- Some countries and transporters have more stringent requirements than DOT or IATA. For example, the United Parcel Service (UPS) publishes its own Guide for Shipping Ground and Air Hazardous Materials. URS shipping training and this program may not meet these additional requirements.
- Contact the applicable shipping company, shipping specialist, or the hotline if you are unsure or suspect there may be additional, special requirements on a shipment.
- For international shipments an expediter may be required to ensure needed materials are not held in customs. It may be advisable to purchase hazardous materials once you arrive in your destination country.

URS SAFETY MANAGEMENT STANDARD Hazardous Materials/Dangerous Goods Shipping

5. Documentation

All files must be kept in a central location.

A. Training records

- 1. Sign-up sheet with list of employee names, date, management certification.
- 2. Successfully completed tests.
- 3. Outline of course materials.

6. Resources

- A. 49 Code of Federal Regulations, Parts 171-180, Subchapter C--Hazardous Materials Regulations.
- B. Dangerous Goods Regulations. <u>International Air Transport Association.</u> 40th Edition. Effective January 1, 1999.
- C. International Maritime Dangerous Goods Code. International Maritime Organization, Amendment 29-98.
- D. DOT Office of Hazardous Materials Safety
- E. URS HazMat Shipping Support Helpline 800.381.0664
- F. Attachment 48-1 Materials of Trade Summary
- G. Attachment 48-2 Hazardous Materials Certificate of Registration
- H. Attachment 48-3 Hazardous Materials Security Plan

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Health, Safety and Environment

MATERIALS OF TRADE (MOTs) SUMMARY

Attachment 48-1

The Department of Transportation (DOT) adopted the "Materials of Trade" or "MOTs" exception for companies that are not in the business of transporting chemicals. Because URS is in the business of environmental sampling and other field services, URS is able to use this exception. The exception is found in the Code of Federal Regulations: 49 CFR 173.6.

The MOTs exception allows URS Corporation employees to transport certain amounts of chemicals aboard their vehicles without preparing hazardous material paperwork or packaging the hazardous material in specification boxes using hazard labels and required markings.

MOTs must be packaged in the manufacturer's original packaging, or a packaging of equal or greater strength or integrity. Gases must be in DOT specification cylinders. If the inner container (such as the bottle) is secured against movement inside the vehicle (if it is kept in a cabinet or tool box), then no outer packaging (such as a cardboard box) is required. The MOT must be marked with a common name or the technical name.

No hazardous material training is required, except that the driver must be familiar with the MOTs exception. The driver is not allowed to exceed total aggregate weight of 440 pounds of MOTs aboard the vehicle.

The hazardous material classes and quantities of HAZMAT items typically transported by URS field can be transported as MOTs:

The inner container of a Packing Group II and III material in Class 3, 8, 9, Division 4.1, 5.1, 5.2, 6.1, or ORM-D cannot exceed 66 pounds or 8 gallons each.

A Division 2.1 or 2.2 cylinder cannot exceed 220 pounds.

The inner container of a Packing Group II or II material in Division 4.3 cannot exceed 1 ounce.

Be careful not to exceed the 440-pound upper limit weight restriction.

UNITED STATES OF AMERICA DEPARTMENT OF TRANSPORTATION PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION



HAZARDOUS MATERIALS CERTIFICATE OF REGISTRATION FOR REGISTRATION YEAR(S) 2007-2008

Registrant: URS

Attn: ANDREW ROMACH 1600 PERIMETER PARK MORRISVILLE, NC 27560

This certifies that the registrant is registered with the U.S. Department of Transportation as required by 49 CFR Part 107, Subpart G.

This certificate is issued under the authority of 49 U.S.C. 5108. It is unlawful to alter or falsify this document.

Reg. No: 070207 550 044P Issued: 07/02/2007 Expires: 06/30/2008

Record Keeping Requirements for the Registration Program

The following must be maintained at the principal place of business for a period of three years from the date of issuance of this Certificate of Registration:

- (1) A copy of the registration statement filed with PHMSA; and
- (2) This Certificate of Registration

Each person subject to the registration requirement must furnish that person's Certificate of Registration (or a copy) and all other records and information pertaining to the information contained in the registration statement to an authorized representative or special agent of the U. S. Department of Transportation upon request.

Each motor carrier (private or for-hire) and each vessel operator subject to the registration requirement must keep a copy of the current Certificate of Registration or another document bearing the registration number identified as the "U.S. DOT Hazmat Reg. No." in each truck and truck tractor or vessel (trailers and semi-trailers not included) used to transport hazardous materials subject to the registration requirement. The Certificate of Registration or document bearing the registration number must be made available, upon request, to enforcement personnel.

For information, contact the Hazardous Materials Registration Manager, PHH-62, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 1200 New Jersey Avenue, SE, Washington, DC 20590, telephone (202) 366-4109.



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Health, Safety, and Environment Program

HAZARDOUS MATERIALS SECURITY PLAN

Attachment 48-3

Issue Date: March 2004

Be assured that the Carrier transporting URS material has a HAMZAT Security Plan in place that adequately addresses the assessed security risks of the material to be transported, including risks related to storage of the material during transportation.

Be assured that the Carrier has a Centralized Communication System in place and Shipper Alerts in the event of incidents during transportation (including theft, non-receipt of material, accident, etc.).

Conduct periodic compliance review of Carriers to ensure compliance with HAZMAT Security requirements. If HAZMAT stored during transportation, verify security of storage location.

Verify Driver Identification at pickup: Require all drivers to present a valid driver's license with HM endorsement, if required, when picking up HAZMAT for transport. Require all drivers to provide proof of employment with selected, pre-qualified Carrier. Require driver to sign HAZMAT Bill of Lading if placards offered.

URS employee responsible for selecting carriers and establishing routes to select carefully all transportation routes, taking into account quantity and nature of the HAZMAT, safe areas, duration of the journey.

EG&G Customs Confiscation Group follows the "Standards for Cargo Security" based on United States Treasury Decision 72-56 and Customs regulations in 19 CFR. These security standards consist of two elements:

- (1) Physical Security Standards (which address buildings; fencing; gates; gate houses; parking; lighting; locks, locking devices, and key control; high-risk cargo).
- (2) Procedural Security Standards (which address personnel screening; security personnel; communications; identification system; independent contractors; cargo quantity control; delivery procedures; containerized shipments; security education).

The three areas required to be addressed by DOT (Personnel Security, Unauthorized Access, En route security) are addressed thoroughly in the requirements of these standards. These standards will suffice as a DOT Security Plan for the EG&G Customs Confiscation Group and the Security Education required by these standards will suffice for required DOT HAZMAT Security Plan training.



HAZARDOUS MATERIALS SECURITY PLAN

Attachment 48-3

Issue Date: March 2004

PURPOSE & APPLICABILITY:

URS Corporation (URS) must maintain a Hazardous Material (HAZMAT) Transportation Security Plan **as required under 49 CFR 172.800**. URS has the potential to ship a quantity of hazardous material that requires placarding under 49 CFR Subpart F [49 CFR 172.800(b)(7)]. Therefore, URS must develop a HAZMAT Security Plan that addresses security concerns for those specific shipments and for the HAZMAT employees who prepare the shipments.

OWNERSHIP AND APPROVAL:

The URS HSE Manager owns and approves the Corporate Security Plan. A HAZMAT Security Specialist will be designated at each URS facility with the potential to be subject to Security Plan requirements. The site HAZMAT Security Specialist will be responsible for developing, maintaining, reviewing, and updating a security plan specific to their site operations. All revisions must be approved by the document owner or designee prior to inclusion.

TRAINING:

URS HAZMAT employees affected by the Security Plan will be trained to the requirements of this Plan.

The scope of the HAZMAT Security Plan is "limited to applicants for HAZMAT employee positions that involve access to or handling of the hazardous materials covered by the security plan." Only those employees who work directly with placardable quantities of hazardous materials will require training under this plan.

HAZMAT Security Training is required every 3 years. If no changes are made to the plan, this 3-year cycle is sufficient. If changes are made to the plan, employees must be trained to understand the changes at the time they go into effect.

All new HAZMAT employees must receive General Awareness HAZMAT Security Training within 90 days of hire. Existing HAZMAT employees must receive General Awareness HAZMAT Security Training with their next scheduled recurrent HAZMAT shipping training.

PLAN ORIGIN / REVIEW:

Each URS site-specific Security Plan will be reviewed and updated, as required, based on the individual site's shipping activities for placardable quantities of HAZMAT. In certain instances, URS HAZMAT activities may be operating under existing security plans issued by other Federal agencies (such as U.S. Customs); or URS HAZMAT activities may be conducted onsite at another company, coming under the auspices of that company's Security Plan. As allowed by 49 CFR



HAZARDOUS MATERIALS SECURITY PLAN

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172.804, so long as the Security Plan issued by the other agency or company contains all of the elements required under 49 CFR 172.802, that plan may serve as the URS site-specific Security Plan.

RISK ASSESSMENT:

Hazard Analysis

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Potential URS activities that may be ship placardable quantities of HAZMAT are:

- (1) Environmental sampling support chemicals (cylinders, solvents, etc.)
- (2) Laboratory hazardous waste (primarily Class 3 and Class 8)
- (3) Because URS provides environmental management services to clients, certain URS employees may function in the role of HAZMAT employee to another company and, for that reason, would be required to be trained to that company's HAZMAT Security Plan.
- (4) EG&G--Coordinate Transport of Confiscated Customs items. Types of HAZMAT items vary and may include explosives [grenades, small arm propellant powders, cigarette lighters, refrigerant gases (R-22)].

Hazard Classes/Divisions of HAZMAT offered for shipment in placardable quantities include:

- (1) Class 1 [Division 1.2, 1.4 (confiscated Customs explosives)]
- (2) Division 2.2 (refrigerant gases; calibration gases with low parts per million (ppm) levels of constituents used for air pollution environmental analysis)
- (3) Division 2.1 (cigarette lighters; calibration gases containing higher levels of flammable constituents used for air pollution environmental analysis)
- (4) Class 3 (solvents)
- (5) Division 6.1 (PGII or PGIII)

Of the hazardous materials listed above, the materials of greatest concern from a security risk as potential weapons or targets of opportunity for terrorist activities would be **Division 1.4**, **Division 2.1**, **and Class 3**.

Cylinders containing non-toxic, nonflammable calibration gases (Division 2.2) are not viewed as a major concern for terrorist activities.

Even though certain types of HAZMAT offered by URS pose greater threat than others, all requirements set out in this plan apply to all placardable quantities of HAZMATs offered for transport.

Facility Security Analysis

Identify potential threat to facility: It is unlikely that terrorists/criminals will look to URS facilities for obtaining hazardous materials for their activities.



HAZARDOUS MATERIALS SECURITY PLAN

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Containment failure/burst drum: HAZMAT in drums is likely to be hazardous waste. Spill procedures in place to minimize spills as required by hazardous waste regulations.

Consequence / Worst-case Scenario Analysis - Factors to consider:

Physical Factors

HAZMAT container size: Largest containers are 55-gallon drums of waste materials. However, most URS chemicals used in support of environmental sampling operations are small inner container sizes (many qualify for limited quantity exception) in combination packages, which pose extremely minimal HAZMAT risk.

HAZMAT storage location within facility: HAZMAT is stored in locked rooms, with limited access to designated HAZMAT employees.

External access: In many instances, the URS premises are located in an office park setting that is patrolled by security guards, providing restricted access by unauthorized persons. In certain instances, HAZMAT is stored outside of the building in a fenced, locked area with security lights (typically cylinders). HAZMAT is also stored inside locked laboratories and waste accumulation areas. Intruders would have to penetrate building HAZMAT storage rooms to reach HAZMAT.

Worst-case Scenario #1: Access by undesirable personnel to drums of flammable liquid waste in waste storage area. To prevent:

Store flammable liquid drums in OSHA-compliant fire proof room with grounding.

Allow limited employee access to fire proof room (which is isolated from other areas of facility).

As always, follow local fire department requirements for flammable liquid storage.

Worst-case Scenario #2: Theft of drums/counter action

Maintain comprehensive HAZMAT inventory; instruct employees to report gaps in inventory to their supervisor

Store drums in limited access area.

Remove HAZMAT from limited access storage area only when packaging/preparing for shipment.

Ensure HAZMAT employee oversees transporter loading activities.

Use reputable transporters; verify identification of drivers; confirm



HAZARDOUS MATERIALS SECURITY PLAN

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employment with scheduled transporter.

PERSONNEL SECURITY:

Verify information provided by job applicants for HAZMAT employee job functions.

URS hiring practices are outlined in a procedure maintained by URS Human Resources Department. Such hiring practices address measures to confirm information provided by job applicants hired for positions that involve access to and handling of the hazardous materials covered by the security plan. As set out in URS Corporation Policies and Procedures Manual, Section 3 Human Resources, 030.020 Recruiting and Hiring, URS Corporation conducts a background check using an outside company on all potential new HAZMAT employees. In these hiring practices, URS uses a third party to verify information related to:

an applicant's recent employment history educational credentials criminal background (felony convictions) pre-employment drug screening references citizenship status

URS obtains, reviews, and approves the HAZMAT Security Plan for any company providing URS with contracted employees for HAZMAT functions

Clients where URS provides HAZMAT staff may require an additional background check.

Train employees to question suspicious behavior, including unknown individuals at the facility. If an individual is seen without identification or escort, take them to the facility reception area.

Report all suspicious persons/behavior to URS supervisor or security.

UNAUTHORIZED ACCESS:

Prevent unauthorized personnel from access to hazardous materials, facility property, and equipment.

Many URS operations provide environmental management services onsite at client locations (including military bases and manufacturing facilities). In these cases, access issues must be addressed in the client's HAZMAT Security Plan. Certain URS offices and locations store HAZMAT prior to shipment in fenced areas with locks and security lighting. Other URS locations with laboratories store waste prior



HAZARDOUS MATERIALS SECURITY PLAN

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to disposal in outside locked, fenced areas. In certain locations, a security guard drives around office park areas after hours and questions suspicious activity.

Hazardous material preparation areas (loading docks) and hazardous waste storage areas accessible only to authorized personnel and remain locked.

Hazardous material storage rooms are available only to authorized personnel with restricted entry (institute a sign-in/sign out procedure or key card entry to track access to those areas).

Maintain the integrity of perimeter fencing and ensure that it meets the security needs of the facility.

Ensure facility yards and parking areas have adequate security lighting.

Ensure all access points (doors and windows) are locked and secured from the outside when not in use.

EN ROUTE SECURITY:

Assess security risks of shipments of hazardous materials covered by the security plan en route from origin to destination, including shipments stored incidental to movement. Shipper has best access to information relative to the hazardous properties of the commodity. Shipper controls include:

Carrier selection and order entry

Loading

Time and Method of Dispatch

Destination

Carrier responsible for transportation/movement. Carrier controls include:

Driving time

Route deviations

Rest Stop Selection

At a minimum, URS shall:

Use reputable transporters such as Fed-ex Ground, Fed-ex Air.

If hiring CDL drivers to transport placardable quantities of HAZMAT (for environmental sampling activities), conduct a driver background check and verify the presence of a HAZMAT Security Plan for the company of these hired drivers.

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies where employees may be exposed to concentrations of specific chemical hazards potentially exceeding permissible limits.

2. Purpose and Scope

This standard provides guidance in controlling potential employee exposures to toxic and hazardous substances specifically regulated by OSHA. These substances include:

Acrylonitrile	13 Carcinogens:
Asbestos	4-Nitrobiphenyl
Benzene	alpha-Napthylamine
Cadmium	Methyl chloromethyl ether
Chromium (VI)	3,3'-Dichlorobenzidine
Coke Oven Emissions	bis-Chloromethyl ether
Cotton Dust	beta-Napthylamine
Ethylene Oxide	Benzidine
Formaldehyde	4-Aminodiphenyl
Hydrogen Sulfide	Ethyleneimine
Inorganic Arsenic	beta-Propiolactone
Lead	2-Acetylaminofluorene
Methylene Chloride	4-Dimethylaminoazobenzene
Methylenedianiline	N-Nitrosodimethylamine
Vinyl Chloride	
1,2-dibromo 1-3 chloropropane	
1,3-Butadiene	

Note: Hexavalent Chromium is covered in <u>SMS 83</u>. Lead in construction activities is covered in SMS 22.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, Country, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure.

4. Requirements

A. Identification of Hazardous Substances

1. Prior to performing any work: including drilling, excavation, demolition, alteration, salvage, repair, restoration, welding, brazing, grinding, other surface disturbing activities, or laboratory activities determine if any of the hazardous substances identified in section 2 of this SMS are present in the work area.

- B. Determine the Potential for Employee Exposure to the Hazardous Substance
 - If any of the substances are identified, conduct an exposure assessment based on the type of work to be performed to determine if employees have the potential to be exposed above any action level identified in the substance-specific regulations. This assessment must be reviewed and approved by a Certified Industrial Hygienist (CIH) approved by a Corporate, Regional, Country, or Strategic Business Unit (SBU) HSE Manager.
 - 2. Include the results of the initial exposure assessment in the facility or site health and safety plan and/or facility or site health and safety file.
- C. Controlling Potential Employee Exposures.
 - Where the initial exposure assessment identifies the
 potential for employee exposures above an established
 action level or permissible exposure limit, develop a facility
 or site-specific program to address all required regulatory
 concerns for that substance(s). Completed programs and/or
 guidance documents are to be included in the facility or sitespecific health and safety plans.
 - 2. Attachment 50-1 provides a general checklist to be used in conjunction with the substance-specific standard, and to assure the program covers all required areas of concern.

D. Compliance Programs

When compliance programs are required by a specific standard, the following outline shall be utilized unless otherwise directed by the standard:

1. Description of work activities that expose personnel.

- 2. Equipment to be used and procedures to be followed during exposure activities.
- 3. Employee job responsibility and crew size during exposure activities.
- Maintenance practices to be followed for servicing and cleaning equipment and disposing of waste.
- 5. Specific instructions on how to set up engineering controls (ventilation; containment; etc.).
- 6. Air monitoring data from initial assessment.
- 7. A detailed work schedule for implementation.
- 8. A description of arrangements made among contractors on multi-contractor sites with respect to informing affected employees of potential exposure.
- 9. Name of Competent Person who will be responsible for performing regular inspections of the job site, materials, and equipment during the job.

A Corporate, Regional, Country, or Strategic Business Unit (SBU) HSE Manager must approve all compliance programs.

E. Training Requirements

- All employees with potential exposure to the substances covered by this SMS must receive appropriate training prior to performing activities that could result in exposure. This training must be performed initially, upon any substantial changes to the operation covered, and annually. In general, the training should cover the following topics unless otherwise indicated by the specific standard:
 - a. Basic Employee Training:

Regulated areas: authorizations, entrance restrictions

Signs and warnings

Container contents identification

The nature of the specific hazards

The specific operations that could result in exposure

The medical surveillance program

Personal protective equipment

Hygiene practices and procedures

Decontamination practices

Respiratory protection requirements

Emergency practices and procedures

Employee's specific role in emergency procedures

Recognition and evaluation of potential hazardous situations

Employee's specific duties and responsibilities

First aid procedures

b. Supervisor Training (in addition to basic employee training):

Operations reports required

Incident reports required

Medical surveillance program

Medical examinations

Recordkeeping

Training program and outline

- 2. All training performed as part of this SMS will be documented and tracked in accordance with <u>SMS 055</u> (Health, Safety, and Environment Training).
- 3. These training records will be maintained for a minimum of 5 years.
- 4. Staff potentially exposed to lead at or above 30 ug/m3 TWA for more than a year will attend refresher training each year this potential exposure exists. After a lapse of over one year, staff will be retrained prior to work on sites with the potential to exceed 30 ug/m3 TWA.

5. Documentation Summary

- A. File these records in the facility or site Safety Filing System:
 - 1. Hazardous substance list.
 - 2. Approved exposure assessment.
 - Completed "Toxic and Hazardous Substance Checklist" (<u>Attachment 50-1</u>) along with any required guidelines and/or programs.
 - 4. Approved Compliance Program.
 - 5. Training Records.

6. Resources

- A. 13 Carcinogens 29 CFR 1910.1003 and 29 CFR 1926.1103-1116
- B. Acrylonitrile 29 CFR 1910.1045 and 29 CFR 1926.1145
- C. Asbestos 29 CFR 1910.1001 and 29 CFR 1926.1101
- D. Benzene 29 CFR 1910.1028 and 29 CFR 1926.1128
- E. Cadmium 29 CFR 1910.1027 and 29 CFR 1926.1127
- F. Chromium (VI) <u>29 CFR 1910.1026</u> and 29 CFR 1926.1126
- G. Coke Oven Emissions 29 CFR 1910.1029 and 29:
- H. Cotton Dust <u>29 CFR 1910.1043</u>
- I. Ethylene Oxide 29 CFR 1910.1047 and 29 CFR 1926.1147
- J. Formaldehyde 29 CFR 1910.1048 and 29 CFR 1926.1148
- K. Hydrogen Sulfide Sampling and Analytical Methods
- L. Inorganic Arsenic 29 CFR 1910.1018 and 29 CFR 1926.1118
- M. Lead 29 CFR 1910.1025 and 29 CFR 1926.62
- N. Methylene Cloride 29 CFR 1910.1052 and 29 CFR 1926.1152

- O. Methylenedianiline 29 CFR 1910.1050
- P. Vinyl Chloride 29 CFR 1910.1017 and 29 CFR 1926.1117
- Q. 1,2-dibromo-3-chloropropane <u>29 CFR 1910.1044</u> and 29 CFR 1926.1144
- R. 1,3-Butadiene 29 CFR 1910.1051
- S. Asbestos Survey and Oversight Operations SMS 008
- T. Chromium (VI) Inhalation Exposure Protection SMS 083
- U. Lead in Construction SMS 022
- V. Personal Monitoring (Industrial Hygiene) SMS 043

URS

Health, Safety and Environment TOXIC AND HAZARDOUS SUBSTANCE CHECKLIST

Attachment 50-1

		Yes	No	N/A
1.	Have hazardous substances present in the workplace been identified?			
2.	Is there a potential for employee exposure above an established action level?			
3.	If the response to question #2 is yes, have you completed a program or developed guidelines to address the following compliance concerns, where applicable, for each identified hazardous substance?			
	Permissible exposure limits			
	Exposure monitoring			
	Regulated areas			
	Compliance program			
	Respiratory protection			
	Protective clothing			
	Hygiene			
	Hazard communication			
	Training program			
	Housekeeping			
	Medical surveillance			
	Medical removal			
	Recorkeeping	1		
	Reporting		}	
	Standard operating procedures			
	Contamination/Waste disposal			
	Emergency response			

Attach all program and/or guidance material for items checked "yes" to this checklist (or indicate where the information can be found in the project/office health and safety plan).

Prepared by:	Date:
Reviewed by:	Date:
Approved by:	Date:



BENZENE HANDLING AND EXPOSURE POLICY AND PROCEDURE

Attachment 50-2

Issue Date: Nov 2006

APPLICABILITY

This is a policy and procedure document for Benzene Handling and Exposure monitoring. This procedure applies to the US-based operations of URS Corporation and its subsidiary companies where Benzene, CAS 71-43-2, is known to be present in the work environment, unless exempted in whole or in part by the scope of 29 CFR 1910.1028, or previously implemented portions of these standards. It can serve as a supplement to a URS-written Health and Safety Plan (HSP) or Safe Work Plan, but should not be considered a substitute for either of those documents.

PURPOSE AND SCOPE

This policy and procedure document provides guidance in controlling potential employee exposure to Benzene. It is an attachment to the URS Safety Management Standard – Specific Chemical Hazards (SMS 50).

IMPLEMENTATION

Implementation of this standard is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure.

ACTION LEVEL / PERMISSIBLE EXPOSURE LIMITS

The Permissible Exposure Limit is 1 ppm (part per million) calculated as an 8-hour time-weighted average. The action level, defined as an airborne concentration of Benzene calculated as an 8-hour time-weighted average, is 0.5 ppm. The Short Term Exposure Limit is 5 ppm for 15 minutes. Benzene has a "skin" designation in California. The Action level is below the typical PID monitoring equipment sensitivity.

REGULATED AREA

The regulated area is defined as any area where airborne concentrations of Benzene exceed or can reasonably be expected to exceed the permissible exposure limits, either the 8-hour time-weighted average exposure of 1 ppm or the short-term exposure limit of 5 ppm for 15 minutes.

EXPOSURE MONITORING

Determinations of employee exposure to Benzene shall be made from representative breathing zone air samples. Representative 8-hour TWA employee exposures shall be determined on the basis of one full shift exposure sample in the work area.



1.)

Health, Safety, and Environment BENZENE HANDLING

BENZENE HANDLING AND EXPOSURE POLICY AND PROCEDURE

Attachment 50-2

Issue Date: Nov 2006

Determinations of STEL compliance shall be made from 15-minute employee breathing zone samples. These samples shall be taken at work areas where it is reasonable to expect higher Benzene concentrations, such as:

- · where tanks are opened, filled unloaded or gauged;
- where containers or process equipment are opened, and
- where Benzene is used for cleaning or as a solvent in an uncontrolled environment.

The remaining elements of monitoring, such as minimum time frames for initial and periodic monitoring and employee notification shall be at least as stringent as OSHA 29 CFR 1910.1028(e)(2) through (e)(7).

Air monitoring options include:

- Benzene-specific instruments such as the UltraRae Benzene PGM-7200 or Draeger CMS;
- · Detector tubes (i.e., Draeger); and
- Sample media for subsequent laboratory analysis.

BENZENE HANDLING AND INFORMATION

Physical and Chemical Characteristics: Benzene is a clear, colorless liquid with a distinctive sweet aromatic odor. Its boiling point is 176 degrees F and its flash point is 12 degrees F. The flammable limits in air are 1.3% - 7.5%. Benzene is a flammable liquid. Its vapors can form explosive mixtures. All ignition sources must be controlled when Benzene is used, handled, or stored. Where liquid or vapor may be released, such areas shall be considered as hazardous locations. Benzene vapors are heavier than air; thus the vapors may travel along the ground and be ignited by open flames or sparks at locations remote from the site at which Benzene is handled. Benzene is typically found combined with other petroleum hydrocarbons, i.e., gasoline or other fuel fractions.

Synonyms: Benzol, benzole, coal naphtha, cyclohexatriene, phene, phenyl hydride, pyrobenzol. (Benzin, petroleum benzin and Benzine do not contain Benzene).

Work Practices: Proper handling of Benzene - containing materials (those materials containing 0.1 percent or more of benzene) can greatly reduce exposure, the need for regulated areas, and the use of protective equipment. The following good work practices must be followed:

 When draining equipment containing Benzene materials, draining must be performed in a closed system;



BENZENE HANDLING AND EXPOSURE POLICY AND PROCEDURE

Attachment 50-2

Issue Date: Nov 2006

- Equipment containing Benzene materials must be cleaned by appropriate method prior to opening; and
- Use Benzene-free purchased products when possible. Types of products, which
 may contain Benzene, include paints, thinners, degreasers, cleaners, etc. Under
 no circumstances are aerosol products containing Benzene allowed to be used.
 Consult MSDS to determine if product is Benzene-free.

HYGIENE / SYMPTOMS OF EXPOSURE

Benzene can affect your health if you inhale it, or if it comes in contact with your skin or eyes. Benzene is also harmful if you happen to swallow it. It has poor warning properties since the mean odor threshold is reported as 34 ppm.

Effects of Overexposure

- 1. Short-term (acute) overexposure: If you are overexposed to high concentrations of Benzene, well above the levels where its odor is first recognizable, you may feel breathless, irritable, euphoric, or giddy; you may experience irritation in eyes, nose, and respiratory tract. Locally, irritation and reddening of the skin may occur and in severe cases the skin may blister. You may develop a headache, feel dizzy, nauseated, or intoxicated. Severe exposures may lead to convulsions and loss of consciousness / coma.
- Long-term (chronic) exposure: Repeated or prolonged exposure to Benzene, even at relatively low concentrations, may result in various blood disorders, ranging from a plastic anemia to leukemia, an irreversible, often fatal disease. Many blood disorders associated with Benzene exposure may occur without overt symptoms.
- 3. Target organs / areas of the body:
 - Blood forming systems / bone marrow;
 - Central Nervous System; and
 - Eyes, skin, respiratory system.



BENZENE HANDLING AND EXPOSURE POLICY AND PROCEDURE

Attachment 50-2

Issue Date: Nov 2006

STANDARD OPERATING PROCEDURES

The following sign shall be posted at entrances to any Benzene regulated area:

DANGER
BENZENE
CANCER HAZARD
FLAMMABLE – NO SMOKING
AUTHORIZED PERSONNEL ONLY

Containers of Benzene in the workplace shall bear the following forms of warning:

DANGER
CONTAINS BENZENE
CANCER HAZARD

MEDICAL SURVEILLANCE

Medical surveillance shall be made available for any employee who is or may be exposed to Benzene at or above the action level for 30 or more days per year. Medical surveillance shall also be made available for employees that are or may be exposed to Benzene at or above the PELs for 10 or more days per year, or for any employee exposed to Benzene in an emergency situation. All medical examinations and procedures shall be performed by or under the supervision of a licensed physician. An accredited laboratory shall conduct all laboratory tests. All medical examinations and procedures will be provided by URS to its employees without cost, and at a reasonable time and place.

Additional elements of medical monitoring, such as examinations, referrals, and physician's opinions shall be at least as stringent as OSHA 29 CFR 1910.1028(i)(2) through (i)(7).

Medical Removal Plan: When a physician makes a referral to a hematologist/internist, the URS employee will be removed from areas where exposures may exceed the Action



BENZENE HANDLING AND EXPOSURE POLICY AND PROCEDURE

Attachment 50-2

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level until such time as the physician makes a medical determination. Additional elements of the medical removal plan, such as follow-up examinations and medical removal protection benefits shall be at least as stringent as OSHA 29 CFR 1910.1028(i)(8) through (i)(9).

WRITTEN COMPLIANCE PLAN

Engineering controls and work practices shall be instituted whenever feasible, to reduce and maintain employee exposures to Benzene at or below the PEL, except to the extent that URS can establish that the controls are not feasible per OSHA 29 CFR 1910.1028(f)(1)(iii) or (g).

When any exposures are over the PEL, URS shall develop a written project and site-specific HSP or Safe Work Plan which will include a compliance program to reduce employee exposure to or below the PEL primarily by means of engineering and work practice controls. The compliance program will be at least as stringent as OSHA 29 CFR 1910.1028(f).

PERSONAL PROTECTIVE EQUIPMENT / RESPIRATORY PROTECTION

Personal Protective Equipment (PPE): PPE shall be worn where appropriate to prevent eye contact and limit dermal exposure to liquid Benzene. Eye and face protection shall meet the requirements of OSHA 29 CFR 1910.133. Appropriate protective equipment shall include such items as boots, gloves, sleeve, aprons, etc. Splash-proof safety goggles shall be provided if it is possible that Benzene liquid could get into your eyes. Details shall be provided in the written project and site-specific HSP.

Respiratory Protection: Respirators are required for those operations in which engineering controls or work practice controls are not feasible to reduce exposure at or below the PEL. However, where it can be documented that Benzene is present in the workplace less than 30 days a year, respirators may be used in lieu of engineering controls. If respirators are worn, they must have certification by the National Institute for Occupational Safety and Health (NIOSH), and respirator cartridge or canisters must be replaced before the end of their service life, or the end of the shift, whichever occurs first. All employees wearing a respirator must be a part of the medical surveillance program. Additionally, they must have undergone a respirator fit test prior to work assignment.

HAZARD COMMUNICATION

URS will provide access to its employees, of any Material Safety Data Sheet (MSDS) that addresses the Benzene content in the workplace, complying with OSHA 29 CFR 1910.1200(a)(8).

Employees who work with Benzene shall be Hazard Communication trained, in accordance with OSHA 29 CFR 1910.1200(h)(1). Additionally, they shall be informed of



BENZENE HANDLING AND EXPOSURE POLICY AND PROCEDURE

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any areas in their workplace where Benzene is present, and the location and availability of a written Hazard Communication program. In California, employees will also be informed of the provisions of Proposition 65.

TRAINING

Information and training shall be provided to employees at the time of initial assignment to a work area where Benzene is present. For those employees who work in areas known or expected to be above the Benzene Action level, information and training shall be provided upon their initial assignment in the work area, and annually thereafter.

Additionally, URS shall provide to its employees an explanation of the contents of the Benzene Occupational Safety and Health Standard – OSHA 29 CFR 1910.1028, including Appendices A and B, and shall inform its employees of:

- Where the standard is available;
- A description of URS' medical surveillance program; and
- An explanation of the information contained in Appendix C of the standard.

RECORDKEEPING

URS will establish and maintain records regarding employee exposure, monitoring and sampling, exposure levels, and respiratory devices to be worn. URS will retain these records for at least 30 years, in accordance with OSHA 29 CFR 1910.1020.

PROJECT AND SITE-SPECIFIC BENZENE HANDLING INFORMATION

The following topics related to Benzene handling should be considered project and site-specific, and will depend on the details of the project involved. A HSP or Safe Work Plan shall be written for any project / work assignment involving Benzene and should address the following additional topics:

Housekeeping;

. _1

- Emergency Response; and
- Benzene Contamination / Waste Disposal / Spill Reporting.

Issue Date: February 2001 Revision 5: May 2007

URS SAFETY MANAGEMENT STANDARD Vehicle Safety Program

1. Applicability

This standard applies to the operations of URS Corporation and its subsidiary companies.

This Safety Management Standard (SMS) applies to employees operating motor vehicles that are owned, rented or leased by the Company, and the use of personal or government supplied vehicles while on Company business.

This SMS does not apply to heavy equipment operations (see SMS 019).

2. Purpose and Scope

This Safety Management Standard defines the policies that help URS minimize losses, injuries, and legal liabilities associated with improper vehicle use.

The Standard applies to operations world-wide. Some terminology may need to be read in context of local or national regulations for countries outside the US.

3. Implementation

The overall responsibility for program implementation is with the URS Office Manager. Other responsibilities include:

Administration - Fleet management, participation in the Vehicle Safety Program,

vehicle acquisition, insurance claims reporting, controlling access to vehicles, maintenance of vehicles, participating on accident

review processes.

Human Resources - Documentation of driver's license annually, participation in the

accident review processes.

Health and Safety - Employee safety training, maintenance of the vehicle safety

program, and participation in the accident review processes.

Employee - Familiarization with URS Vehicle Safety Program and compliance

with its requirements.

4. Requirements

A. Authorized Drivers

- Authorized Drivers are those individuals permitted to drive URS owned, leased, or rented vehicles, and employees driving a personal vehicle for work purposes being reimbursed mileage.
- 2. Must be at least 18 years of age (non-commercial license) or 21 years of age (commercial license) and have a current driver's license for the

Issue Date: February 2001 Revision 5: May 2007

URS SAFETY MANAGEMENT STANDARD Vehicle Safety Program

appropriate class of vehicle (unless more stringent requirements are established by the leasing/renting agency).

3. Human Resources / Administration - will annually obtain and review a copy of the state issued drivers license for all Authorized Drivers'. The Operating Unit Manager shall audit this function annually. URS employees that are Authorized Drivers shall provide a copy of their driver's license upon request. Authorized drivers who lose their license through legal action *must* notify their Human Resources Representative immediately. The Human Resources Representative will notify the Fleet Manager.

4. Authorized drivers must:

- a. Review the Vehicle Safety Program (<u>SMS 057</u>) and sign the Drivers Information form (<u>Attachment 57-2</u>) annually.
- b. Report any conviction for driving under the influence of drugs or alcohol to the HR representative responsible for your office or operation.
- c. Complete vehicle safety training; URS online training module and other sanctioned driving courses described in section -4.B. Training.
- d. Report all accidents. If the authorized driver has an accident in a URS owned, rented or leased vehicle, the accident must be reported immediately to the Office Manager. The <u>SMS 57-1</u> form must be completed and submitted to the local Fleet Manager and copied to the Regional HS&E Manager (see 57-1 for reporting instructions).
- e. Cooperate with any URS investigation concerning the accident.
- f. Complete remedial driver safety training described in 4.B.2 as appropriate following an accident.
- Non-URS employees (e.g., subcontractors, alliance partners) may operate URS vehicles only when this activity is specifically agreed to in the applicable contract, and only within the parameters of the contract and project plans.
- 6. URS operations or offices that plan vehicle use that requires compliance with Federal motor carrier regulations, the affected manager directing operations at the facility or site must obtain approvals from the URS Vice President of Health, Safety, and Environment and the URS Fleet Manager. This requirement typically applies to vehicles with a gross

URS SAFETY MANAGEMENT STANDARD Vehicle Safety Program

vehicle weight over 10,000 pounds, vehicles carrying more than 15 passengers, or vehicles used for hazardous materials transport. The driver must have an appropriate commercial driver's license and may be subject to medical surveillance (see <u>SMS 24</u>).

7. Only Authorized Drivers can be reimbursed mileage for the use of their person vehicle on company business. Requests for reimbursements for mileage by non-designated drivers shall be denied.

B. Training

- 1. Authorized Drivers shall be provided basic driver safety training, including a review of the URS Vehicle Safety Program (<u>SMS 057</u>) and the on-line training within 3 months of their hire date.
- 2. Authorized Drivers shall complete the 4-hour web based defensive driving training program provided through the National Safety Council (NSC). Other defensive driving training programs that are equivalent or exceed the NSC training (i.e., the Smith Driving System) may be substituted by approval of the Regional Safety Manager. The internet web site for the NSC training is located at http://www.safetyserve.com/urscorp. Use URSDDC as the access code. All URS authorized drivers shall complete this web-based training or equivalent training by 2010.
- 3. Additional training is required for employees that have been involved in a chargeable vehicle accident where \$2,000 in damages was sustained or when the accident includes a police citation. This additional training will be in the form of a behind the wheel training equivalent to the Smith Driving System.
- C. General Operating Policy and Procedure (Applies to Authorized and Non-Authorized Drivers Operating Motor Vehicles on Official Company Business)
 - Only properly licensed employees who are specifically authorized to drive Company vehicles may operate company owned/rented/leased motor vehicles.
 - Authorized drivers required to operate vehicles with special hazards (i.e.
 trucks carrying fuel cells, vehicles used to tow trailers, vehicles with
 limited visibility, etc.) shall be thoroughly briefed on the hazards and
 control measures necessary for safe operation of the vehicle. The local
 Company operation shall maintain documentation of the briefing.
 - 3. Drivers/operators shall know and obey all federal, state and local motor vehicle laws applicable to the operation of their vehicle.
 - 4. A driver shall not permit unauthorized persons to operate a URS owned/rented/leased vehicle.
 - URS policy regarding reimbursement and insurance coverage requirements for use of personal automobiles may be found in the Policy

URS SAFETY MANAGEMENT STANDARD Vehicle Safety Program

- and Procedures Manual (Section 074.020). Only Authorized Drivers may be reimbursed mileage for the use of a personal vehicle.
- All cargo extending 4 feet or more beyond the end of a truck, trailer or similar vehicle shall be clearly marked with a red warning flag or cloth measuring no less than 16 inches square. Red lights must be used at night.
- Company owned/rented/leased vehicles are for official business use only and are not to be used for personal activities without the specific approval of a Division Manager, Senior Vice President, or the URS Fleet Manager.
- 8. Seat belts and shoulder harnesses (occupant restraint systems) shall be worn or used whenever the vehicle is in operation. The vehicle may not move until all passengers have fastened their restraints. Vehicles are not to be operated or used by Company employees if seatbelts are not included as part of the vehicle's safety equipment.
- 9. When parking or leaving a vehicle, the following procedures must be followed: Shut off the engine, engage the transmission in park (automatic transmission) or first gear (standard transmission), set the parking brake, remove the ignition keys, and lock the vehicle.
- 10. The vehicle's engine is to be turned off during refueling. Smoking or cellular phone use is not allowed while refueling.
- 11. Drivers/operators will not drive or operate vehicles while under the influence of alcohol or illegal drugs. Further details on the URS Substance Abuse Policy may be found in the Policy and Procedure Manual (section 034.030).
- 12. Drivers/operators will not drive or operate vehicles while under the influence of medications when told by a physician, another healthcare provider, or the manufacturer (i.e. instructions on the label) that the activity is unsafe.
- 13. Vehicle operators are responsible for any fines levied by law enforcement agencies for the operation of their vehicles.
- 14. Driver/operators may not deactivate or muffle any backup warning device.
- 15. Distractions while driving are a major cause of accidents. Distractions include the use of cellular phones, eating, and engaging in intense conversations. URS Authorized drivers must exercise proper control of the vehicle at all times, including the management of possibly distracting actions and behaviors. If you have to eat, pull over and park. If you become engaged in an intense conversation to the point of distraction, pull over and park or end the conversation.
- 16. The use of cellular phones, including cellular phones with handsfree devices is prohibited. If you need to make a call on a cellular phone, pull over and park in a safe area. This prohibition includes text messaging and other wireless devices (e.g. Blackberry).

URS SAFETY MANAGEMENT STANDARD **Vehicle Safety Program**

D. Field / Site Vehicle Safety

- 1. Define specific vehicle travel routes and parking areas at field sites. Use fencing, cones or other markings to define roads and parking. SMS 32 provides additional information on Work Zone Traffic Control.
- 2. If parking on the shoulder of an active road, park as far off the road as possible.
- 3. If work is required alongside an active road (e.g., surveying) park the vehicle behind the area of work to provide a barrier against out-of-control vehicles.
- 4. URS will not transport DOT-placard quantities of hazardous materials. However, small quantities of hazardous materials (e.g., sample coolers) may be transported if properly packaged. Be careful to prevent chemical contamination of the vehicle. Further details on DOT shipping may be found in the DOT Shipping SMS 048.
- 5. Nuclear density meters (e.g., Troxler units) may be transported only by employees who have been trained in the use of nuclear density meters (see SMS 044). Nuclear density meters must be secured from movement and locked during transport. NRC and state-specific regulations regarding transport documentation also apply.
- 6. When performing fieldwork requiring the blocking of traffic lanes (e.g., bridge inspection), follow URS SMS 032, the Manual on Uniform Traffic Control Devices for Streets and Highways (ANSI D6.1) and local police requirements for barriers, cones, and flaggers.
- 7. No employee may ride in the bed of a pickup truck unless seating and restraints are provided for this specific use.
- 8. Articles, tools, equipment, etc. placed in vehicles shall be stored as not to interfere with vision or the proper operation of the vehicle in any way. This also includes preventing items from flying about or out of the vehicle during sudden stops, turning, etc.
- 9. Trucks or vehicles with obstructed rear-view mirrors must observe the following procedures when backing up: Position an employee to act as a spotter at the rear of the vehicles, in the driver's line of sight, to ensure that the area behind the truck is clear. If no other employee is present, then the driver must step out of the vehicle and check the area behind the vehicle before backing up. As an added precaution, avoid backing up whenever possible.
- 10. All uncontrolled intersections (no traffic lights or traffic signs) shall be treated as a 4-way stop. The driver shall exercise extreme caution at uncontrolled intersections.
- 11. URS drivers carrying more than 15 passengers shall perform route planning. Route planning will address hazards associated along the intended route including lack of traffic controls, speed, and hazards

URS SAFETY MANAGEMENT STANDARD Vehicle Safety Program

associated with road conditions, weather, visibility, and other threats. Route planning shall be verified by the Office or Site Manager.

12. On buses and vehicles capable of carrying more than 15 passengers, no passengers may ride in a seat in the driver's row, which would otherwise impede the driver's lateral visibility.

E. Accident Response and Reporting

- 1. In case of injury, call or have someone else call, 9-1-1 immediately for emergency assistance. If you are involved in an accident and are not injured, do the following:
 - a. Protect the accident scene.
 - b. Do not admit liability or place any blame for the accident.
 - c. Provide only your name, address, driver's license number, and vehicle insurance information.
 - d. Obtain the following:
 - i. name(s), addresses, and telephone number(s) of the owner
 - ii. driver and occupants of other vehicle(s)
 - iii. the owner's insurance company
 - iv. driver's license number
 - v. year, make, model and license number of the vehicle(s)
 - vi. name(s) and addresses of any witnesses

e. DO NOT:

- Call the insurance company; the Fleet Manager's office will do this (unless the incident involves your personal vehicle).
- Give a statement to the press.
- Give a signed statement to the claims adjuster representing the other driver's insurance company.

NOTE: The Auto Claim Report (Attachment <u>57-1</u>) for Companyleased or owned vehicles is located in the vehicle glove compartment. The driver must complete this form at the scene of the accident and submit it to management along with a copy of the most recently submitted <u>SMS 57-2</u> Driver's Information form.

2. Notification

All accidents with a Company-leased, rented, or owned vehicle must be reported to your Office/Branch Manager/Supervisor and Regional HS&E Manager and local Fleet Manager within 24-hours of the time it occurs. Use the Auto Claim Report (Attachment <u>57-1</u>) for this purpose.

The Fleet Administrator will report the accident to the insurance carrier (leased and owned vehicles only) promptly.

F. Accident Review

- 1. A violation of the policy in this Vehicle Safety SMS is subject to disciplinary action up to and including termination. The Fleet Manager will review all accidents involving URS-owned, rented or leased vehicles.
- 2. The Company may suspend the privilege to operate vehicles on Company business due to non-compliance with the URS Vehicle Safety Program, involvement in a motor vehicle accident, or resulting citations or other legal actions associated with motor vehicle violations. Personnel authorized to suspend an employee's status as an Authorized Driver include:
 - a. A Project Manager with responsibility for dedicated vehicles on a site. The suspension is applicable to those site vehicles only.
 - b. A URS Operations Manager responsible for the employee.
 - c. The URS Fleet Manager.
 - d. The URS Health and Safety Director.
- 3. The employee's driving privileges will be suspended for any of the following:
 - a. Accidents or legal action involving alcohol or drug use (e.g., DUI).
 - b. Driving without a license.
 - c. Hit-and-run driving / leaving the scene of an accident.
 - d. Unauthorized use of Company vehicles (i.e. using a company vehicle for moving personal items, carrying passengers who are not associated with work activities, etc...).
- 4. The employee's driving privileges may be suspended for any of the following:
 - a. Two or more accidents involving the same Authorized Driver within a 12 month period
 - b. Multiple speeding tickets or multiple citations for violations of the motor vehicle code.
 - c. Multiple complaints from other employees or members of the public about driving performance.

URS SAFETY MANAGEMENT STANDARD Vehicle Safety Program

- d. Any accident caused by a URS Authorized Driver where damages exceed \$2,000.
- e. Failure to comply with the cellular phone use policy.
- 5. An Authorized Driver's driving privileges may be reinstated if:
 - a. For any suspension resulting from law enforcement agency legal action involving drugs and alcohol on the part of the former Authorized Driver– the driving privileges may be reinstated only by concurrent agreement from the Operating Unit Manager, the URS Fleet Manager, the URS Health and Safety Director, and the appropriate Human Resources Regional Manager.
 - b. For those Authorized Driver's privilege suspensions that are not related to driving under the influence of drugs or alcohol, privileges may be reinstated with concurrent agreement by the URS Operating Unit Manager and the URS Health and Safety Director upon completion of required remedial training (see section 4.B.2 of this SMS).
- 6. Disciplinary action includes possible:
 - a. Loss of URS driving privileges
 - Additional driver safety training (required for accidents resulting in more that \$2,000 in damages – optional for all other accidents).
 Refer to section 4.B. Training.
 - c. Suspension without pay
 - d. Termination

G. Inspection

- 1. The driver is responsible for inspecting the vehicle prior to use and not driving a vehicle with obvious safety defects.
- 2. Basic safety checks must include:
 - a. Tire condition/pressure
 - b. Lights/turn signals
 - A clean windshield and adequate window washer fluid
 - d. Gauges/warning lights indicating a normal condition
 - e. Mirrors properly adjusted
 - f. Brakes with adequate pedal pressure for proper braking
 - g. Any defects must be reported to the local office Fleet Representative/Office Administrator.
 - h. Vehicle Maintenance

URS SAFETY MANAGEMENT STANDARD Vehicle Safety Program

- i. The Office Administrator (or designee) is to ensure that all URS-leased/owned vehicles are properly maintained.
- j. Routine maintenance must be performed in accordance the schedule provided in the owner's manual stored in the vehicle.
- k. Reported defects/problems with vehicles must be repaired promptly.

5. Documentation Summary

- A. Auto Claim Report (Attachment SMS 57-1)
- B. Driver's Information (Attachment SMS-57-2)

6. References

The following sites provide additional information to assist you:

- A. National Safety Council; Information on Defensive Driving Courses http://www.nsc.org/psg/ddc.htm
- B. AAA Foundation for Traffic Safety http://www.aaafts.org/
- C. Smith Driving System http://smith-system.com/
- D. 4-Hour Defensive Driver Training http://www.safetyserve.com/urscorp

password: URSDDC



Health and Safety Program

AUTO CLAIM REPORT

Attachment 57-1 Page 1 of 2

Revision 4: Feb 2007

To be used for <u>all</u> vehicle accidents involving URS-leased/rented/owned vehicles and for personal vehicles used on company business.

Was the employee injured? Yes \square No \square	Job Title:	_ Age: _
Was anybody else injured?		
Office Location	Contact Person	
Phone Number	Fax Number	
Describe Injury (including medical treatment	t, if any):	
j		
· 		
· · ·	ess at the time of accident? Yes [n Number (company or personal):	No
Rental Vehicle		
Government or Customer Vehicle		
Year Make	Model	
Other Driver's Information		
Name	Phone Number	
Insurance Co.		
License Plate #		
Description of Accident		
Date of Accident	Police Report#	
Location of Accident	Police Department	
Description (provide a clear, inclusive description		

All accidents <u>occurring in the US</u> shall be reported to: URS Corporation

Kay Tenuta in the Tampa, FL. Office. 813-636-2196, 813-636-2111 (Fax)

All accidents <u>occurring outside the US</u> shall be reported to the Regional or SBU HS&E Manager.



Health and Safety Program

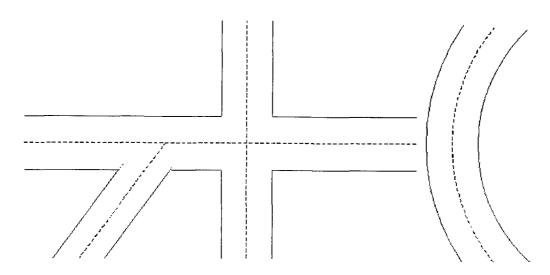
AUTO CLAIM REPORT

Attachment 57-1 Page 2 of 2

Revision 4: Feb 2007

To be used for <u>all</u> vehicle accidents involving URS-leased/rented/owned vehicles and for personal vehicles used on company business.

Draw a diagram showing the position of vehicles before and after the accident. Correct the diagram to fit your situation.



Check all applicable conditions on each subject

enser an approause contactors on each subject										
WEATHER	LIG	HTING		RO	AD SURFACE	ROA	AD DESC	RIPTIC	N	
☐ Clear		Daylight [Dark		Dry		Straight			Curve
Cloudy		Dusk [Dawn		Wet		Level			
☐ Fog		Dark - no street	lights on		Muddy		Hill	□ Up		☐ Down
Rain		Dark - street ligh	nts on		Snowy		Paved			Black top
Snow		Headlights			Snow-covered		One-way	y		
Sleet		Headlights on di	m		Ice in places		Two-way	y		
Other		Headlights on bi	right		Ice -covered		Divided	road		
		No lights on			Other		Intersect	tion		
ACTION OF DRIVER		You	Other	_	What was speed	limit?	Traff	ic con	trol	
Exceeding safe speed						MPH		Signal	lights	i
On wrong side of street						_		Caution	n ligh	ts
Did not have right-of-wa	ау				Witnesses?			Stop si	gn	
Disobeyed traffic signal					☐ Yes ☐] No		Police	office	r
Passed illegally								None	[Other
Improper turning							_			
Improper backing					Witness Name					
Following too closely]	Address					
Failure to signal				}						
Improper lane change									-	
Misjudged clearance					Name					
Other					Address					



DRIVERS INFORMATION

Attachment 57-2 Revision 1: Feb 2007

Policy

All Company employees who operate a vehicle on company business must comply with the URS Vehicle Safety Program (SMS 57). Violation of this policy is subject to disciplinary action up to and including termination.

License

I currently have a valid driver license and authorize URS, its agents, or insurance carrier to verify my motor vehicle record.

I agree to notify my manager or supervisor immediately if my driver's license is suspended or revoked.

Please Print Legibly

Name			Date of Birth	
First	Middle	Last		
License Number		State	Class	
Employee Signature			Date	
Repeated accidents, loresult in loss of permis			S' Vehicle Safety Progra	m will
(Attach the applicant's the license must be leg			copy this sheet. All infor	mation on
			<u> </u>	
				•



Attachment 57-3

ACCIDENT REVIEW & CLASSIFICATION CHECKLIST

The Accident Review Committee may use this checklist as a guide for determining if the accident was **preventable** or **non-preventable**.

If the answer to any of the following questions is "no", our driver failed to make the correct decisions and contributed to the accident. Please check the appropriate answer.

	YES	NO
INTERSECTIONS	ver in the state of	The North
Did our driver approach the intersection at a controlled speed that was reasonable for the conditions?		
Was our driver prepared to stop before entering the intersection?		
Did our driver make certain the other driver was stopping for a traffic light or stop sign?		
Did our driver obey all traffic signs?		1
Did our driver signal well in advance of his/her change in direction?		
Did our driver turn from the proper lane?		
Was he/she alert for the turns of other vehicles?		
Did he/she avoid overtaking and passing in the intersection?		
Did he/she refrain from jumping the green signal?		
Did our driver refrain from attempting to pass through on a late yellow or an early red signal?		
Did he/she follow the precautionary steps required when approaching a flashing red or yellow signal?		
Did our driver pull out slowly at a blind comer, prepared to stop his/her vehicle if necessary?		
REAR ENDED OTHER VEHICLE	\$7. A	
Was our driver maintaining a safe following distance for speed, traffic and weather conditions?		
Did he/she approach the green traffic light cautiously, expecting the driver ahead to stop suddenly on a signal change?		· · · · · · · · · · · · · · · · · · ·
Did he/she allow the driver ahead to develop adequate space before moving ahead from a standing start?		
Did he/she keep from skidding?		
BACKING		
Was it necessary to back?		
Did our driver have to park so close to the vehicle ahead as to require backing to leave the parking space?		
Was it necessary to drive into the narrow street, dead-end alley or driveway from which he/she backed?		
If he/she could not see where they were backing:		
Did he/she try to get someone to guide them?		
Did our driver look all around the vehicle before getting in?		
Did he/she back immediately after looking?		
Did he/she use the horn while backing?		
Did our driver look to the rear without depending on the rear vision mirror?		
If the distance was long, did he/she stop, get out and look around occasionally?		



Attachment 57-3

ACCIDENT REVIEW & CLASSIFICATION CHECKLIST

	YES	* 1	NO -
Did he/she back slowly?			
Did our driver judge backing clearance accurately?			
PULLING OUT FROM THE CURB			nuásír Íðy
Did our driver look to the rear and front for approaching traffic immediately before starting to pull out?			
Did he/she look back rather than depend upon rear vision mirror?			
Did he/she signal before pulling from curb?			
Did our driver start out only when his/her action would not require traffic to change its speed or direction to avoid him/her?			
Did he/she continue to glance back as he/she pulled out?			
SKIDDING		dwin.	Sale (
Was our driver driving at a speed safe for condition of weather and road? (i.e., fog, steam, dust)			
Was he/she keeping a safe following distance?			
Was he/she expecting ice on and under bridges, in gutters, ruts and near the curb?			
Was he/she alert for melting snow, freezing in the shade, loose gravel, sand, ruts, etc.?			
Did he/she keep out of rail tracks and cross them at wide angles?			
Were the steering and braking actions proper?			
PASSING	- 19 S.A.s 1 - 1	· ·	
Did our driver see enough clear space beyond the vehicle ahead to make the pass safely?			
Did he/she build up enough acceleration before starting the pass to ensure that he would not remain in the oncoming lane unduly long on a two lane road?			
Did he/she stay inside the no-passing lane markings?			
Did our driver allow enough clearance before pulling back into the right lane?			
HEAD-ON COLLISION: OUR DRIVER'S ACTIONS		<u> </u>	34
If there was early indication of erratic driving by the oncoming operator, did our driver immediately begin evasive action?			
Did he/she blow the horn and flash the lights?			
Did he/she slow down quickly and drive to the extreme right side of the road and stop?			
PEDESTRIANS	est to	_ + / , 	j:
Did our driver pass through congested sections anticipating that pedestrians might step in front of the vehicle?			
Did he/she keep as much clearance between the vehicle and parked cars as safety permitted?			
Did he/she refrain from passing vehicles that had stopped to allow pedestrians to cross?			
Did hershe remain from passing vertices that had stopped to allow pedestrians to cross?			
Did he/she check the location of pedestrians before starting on the green signal or riding through on a yellow clearance indication?			
Did he/she check the location of pedestrians before starting on the green signal or riding through on a yellow clearance indication? Was our driver aware of groups of children and prepared to stop in the event one ran into the			
Did he/she check the location of pedestrians before starting on the green signal or riding			



Attachment 57-3

ACCIDENT REVIEW & CLASSIFICATION CHECKLIST

		YES	NO
PARKE	Ď		
Was our driver parked on the proper side of the road?			
Was it necessary to park near the intersection?			
Did he/she have to park on the traveled portion of the highway	on the curve, or on the hill?		
Did he/she park parallel to curb and not more than I S" from it?			
Was it necessary to park close to an alley or directly across fro	m a driveway?		
MISCELL ANEOUS/OTHER	CONSIDERATIONS		
Collision with train			
Our driver fell asleep		···	
Hit stationary object (other than listed previously)			
Open load fell off (not properly secured or regularly checke	ed en route)		
Vehicle door(s) flew open en route, struck other vehicle, or (usually applicable)	cargo fell out and caused accid	ent to followi	ng vehicle
Visibility obstructed by fog, steam or bad weather condition	ns		
Accident Review Committee Members:			
Employee Reviewed: Date of Review:	Accident Date:		
Date of Review:			

URS SAFETY MANAGEMENT STANDARD Cold Stress

1. Applicability

This procedure applies to URS projects where field crews are working outdoors in damp and cool (below 50° F or 10°C) conditions or anytime temperatures are below 32°F or 0°C.

2. Purpose and Scope

The purpose of this procedure is to protect project personnel from the following conditions:

Hypothermia: Hypothermia results when the body loses heat faster than it can be produced. When this situation first occurs, blood vessels in the skin constrict in an attempt to conserve vital internal heat. Hands and feet are first affected. If the body continues to lose heat, involuntary shivers begin. This is the body's way of attempting to produce more heat, and it is usually the first real warning sign of hypothermia. Further heat loss produces speech difficulty, confusion, loss of manual dexterity, collapse, and finally death. Wet clothes or immersion in cold water greatly increases the hypothermia risk. The progressive clinical presentation of hypothermia may be seen in Attachment 59-1.

Frostbite: Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite can be categorized into:

Frost Nip or Initial Frostbite: (1st degree frostbite) Characterized by blanching or whitening of skin.

Superficial Frostbite: (2nd degree frostbite) Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient. Blistering and peeling of the frozen skin will follow exposure.

Deep Frostbite: (3rd degree frostbite) Tissues are cold, pale, and solid; extremely serious injury with possible amputation of affected area.

Frostbite can occur without hypothermia when the extremities do not receive sufficient heat. The toes, fingers, cheeks, and ears are the most commonly affected. Frostbite occurs when there is freezing of the fluids around the cells of the affected tissues. The first symptom of frostbite is an uncomfortable sensation of coldness, followed by numbness. There may be tingling, stinging, or cramping. Contact by the skin with tools or other metal objects below 20°F (-7°C) may result in contact frostbite.

URS SAFETY MANAGEMENT STANDARD Cold Stress

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager and the field supervisor.

4. Requirements

- A. Carefully plan work anticipated to be performed in cool or cold conditions. Include costs in project budgets for specialized equipment and supplies needed to complete the field activities.
- B. Monitor weather forecasts immediately prior to entering the field.
- C. Observe and monitor weather conditions such as ambient temperature, wind speed, and precipitation while in the field. Use Attachment 59-2 to determine wind chill.
- D. Wear at least 3 layers of clothing.

An outer layer to break the wind and allow some ventilation (e.g., Gortex® or nylon)

A middle layer of down, wool, or similar materials to provide insulation

An inner layer of cotton or synthetic weave to allow ventilation

In addition:

Wear a hat. Up to 40% of body heat can be lost when the head is left exposed.

Wear insulated boots or other insulated footwear.

Keep a change of dry clothing available in case work clothes become wet.

Do not wear tight clothing. Loose clothing allows better ventilation.

E. Use the following work practices:

Use Attachment 59-3 to establish work/rest cycles in cold weather.

Drink plenty of warm liquids. It is easy to become dehydrated in cold

URS SAFETY MANAGEMENT STANDARD Cold Stress

weather.

Avoiding caffeine and alcohol. Alcohol will accelerate loss of body heat.

Eat high calorie snacks to help maintain body metabolism.

If possible, heavy work should be scheduled during the warmer parts of the day. Take breaks out of the cold.

Work in pairs to keep an eye on each other and watch for signs of cold stress.

NEVER IGNORE SHIVERING. Persistent or violent shivering is a clear warning that you are on the verge of hypothermia.

Avoid exhaustion.

F. When possible, use the following engineering controls:

Provide shelter to escape cold, wind and precipitation

Provide a source of heat (such as warm packs or portable heaters)

Use insulating materials on equipment handles when temperatures drop below 30°F or -1°C.

- G. Watch for symptoms and signs of hypothermia (see Attachment 59-1).
- H. Treat cold stress illness as follows:

<u>Hypothermia</u>: Prompt treatment of hypothermia is essential. Once the body temperature drops below 95°F or 35°C, the loss of temperature control occurs, and the body can no longer rewarm itself. Initial treatment includes reducing heat loss by moving the individual out of the wind and cold, removal of wet clothing, applying external heat (such as a pre-warmed sleeping bag, electric blanket, or body-heat from other workers) and follow-up medical attention.

<u>Frost Bite</u>: The initial treatment for frostbite includes bringing the individual to a warm location, removal of clothing in the affected area, and, **if help is delayed**, placing the affected parts in warm (100° to104° F or 38° to 40°C) water. Do not massage or rub the frostbite area. After

the initial treatment, wrap the affected area loosely in sterile gauze and seek medical attention.

For further discussion on Cold Stress treatment, please refer to Attachment 59-1

Hypothermia in Water:

Loss of body heat to the water is a major cause of deaths in boating accidents. Often the cause of death is listed as drowning; however the primary cause is often hypothermia. It should also be noted that alcohol lowers the body temperature around two to three degrees by dilating the blood vessels. Do not drink alcohol around cold water. The following table shows the effects of hypothermia in water:

WATER TEMPERATURE	EXHAUSTION	SURVIVAL TIME
32.5° F (0°C)	Under 15 min.	Under 15 to 45 min.
32.5 to 40°F (0 – 4°C)	15 to 30 min.	30 to 90 min.
40 to 50°F (4 – 10°C)	30 to 60 min.	1 to 3 hrs.
50 to 60°F (10 – 16°C)	1 to 2 hrs.	1 to 6 hrs.
60 to 70°F (16 – 21°C)	2 to 7 hrs.	2 to 40 hrs.
60 to 70°F (16 – 21°C)	3 to 12 hrs.	3 hrs. to indefinite
Over 80°F (27°C)	Indefinite	Indefinite

SOME POINTS TO REMEMBER:

Wear your PFD. Review <u>SMS 053</u> - Marine Safety and Boat Operations.

If water is less than 50°F (10°C), wear a wet suit or dry suit for work in water (e.g., wading) or if significant potential to fall in water.

While in the water, do not attempt to swim unless to reach nearby safety. Unnecessary swimming increases the rate of body heat loss. Keep your head out of the water. This will increase your survival time.

Keep a positive attitude about your rescue. This will increase your chances of survival.

If there is more than one person in the water, huddling is recommended.

J. Training

Workers at risk of developing hypothermia or cold-related injury will be trained in:

recognition of the signs and symptoms of cold injury or impending hypothermia,

proper re-warming procedures and appropriate first aid treatment,

proper use of clothing,

proper eating and drinking practices

safe work practices appropriate to the work that is to be performed.

5. Documentation Summary

File these records in the Project Safety File.

- A. Completed Project Hazard Analysis form (see Health and Safety Website "Hazard Analysis")
- B. Cold stress training records

6. Resources

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- A. OSHA Fact Sheets "Protecting Workers in Cold Environments" http://www.osha-slc.gov/OshDoc/Fact_data/FSNO98-55.html
- B. Attachment 59-1 "Signs of, and Treatment for, Cold Stress related Illnesses"
- C. Attachment 59-2(a) "Wind Chill Index" (units in "F and miles/hour)
- D. Attachment 59-2(b) "Wind Chill Index" (units in °C and Kilometers/hour)
- E. Attachment 59-3 "TLVs Work/Warm-up Schedule for Outside Workers based on a Four-hour Shift"
- F. OSHA Publication 3156 Quick Reference Card http://www.osha.gov/Publications/osha3156.pdf

Attachment 59-1 Signs of and Treatment for Cold Stress Related Illnesses

Condition	Signs/Symptoms	Treatment
Hypothermia Mild (98° - 90° F) (36° - 32°C)	shivering lack of coordination stumbling, fumbling hands slurred speech memory loss pale, cold skin	move to warm area stay active remove wet clothes and replace with dry clothes or blankets cover the head drink warm (not hot) sugary drink
Hypothermia Moderate (90° - 86° F) (32° - 30°C)	shivering stops unable to walk or stand confused and irrational	All of the above, plus Call for an ambulance Cover all extremities completely Place very warm objects, such as hot packs or water bottles on the victim's head, neck, chest and groin
Hypothermia Severe (86° - 78° F) (30° - 26°C)	severe muscle stiffness very sleepy or unconscious ice cold skin death	Call for an ambulance Treat the victim very gently Do not attempt to re-warm the victim should receive treatment in a hospital
Frostbite	Cold, tingling, stinging or aching feeling in frostbitten area; numbness Skin color turns red, then purple, then white or very pale skin, cold to the touch Blisters in severe cases	Seek medical attention Do not rub the area Wrap in soft cloth If help is delayed, immerse in warm, not hot, water
Trench Foot	Tingling, itching or burning sensation Blisters	Soak feet in warm water, then wrap with dry cloth bandages Drink a warm, sugary drink

Source: Princeton University, Department of Environmental Health and Safety, posted 2/2/99.

Attachment 59-2(a) Wind-Chill Index (miles per hour and °F.)

4										
			ACTUA	AL THE	RMOM	ETER R	EADIN	G (F)		
	50	40	30	20	10	0	-10	-20	-30	-40
Wind speed in mph			EQI	JIVALE	NT TEI	MPERA	TURE (F)		
calm	50	40	30	20	10	0	-10	-20	-30	-40
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-21	-33	-46	-58	-70
15	36	22	9	-5	-18	-36	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-74	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Over 40 mph		Little D	anger	- -	Incre	asing Da	anger	G	reat Da	anger
(little added effect)	(fo	r properi pers	•	ied	(Dan	ger from	freezin	g of ex	posed	flesh)

¹ Source: Fundamentals of Industrial Hygiene, Third Edition. Plog, B.A., Benjamin, G.S., Kerwin, M.A., National Safety Council, 1988

Attachment 59-2(b) Wind-chill Index¹ (Kilometers per hour and °C.)

Estimated wind speed	Actual temperature reading (°C)												
.	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
(in km/h)	Equi	valen	t chill	tempe	rature	(°C)							
0 (Calm)	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45] -50
8	9	3 🐧	-2	-7	-12	-18	-23	-28	-33	-38	-44	-49	-54
16	4	-2	-7	-14	-20	-27	-33	-38	-45	-50	-57	-63	-69
24	2.	-5 ××	-11	-18	-25	-32	-38	-45	-52	-58	-65	-72	-78
32	0	-7	-14	-21	-28	-35	-42	-50	-56	-64	-71	-78	-84
40	-1	-8	-16	-24	-31	-38	-46	-53	-60	-67	-76	-82	-90
48	-2	-10	-17.	-25	-33	-40	-48	-55	-63	-70	-78	-86	-94 🐷
56	-3	-11	-18	-26	-34	-42	-50	-58	-65	-73	-81	-89	-96
64	3	-11	-19	-27	-35	-43	-51	-59	-66	-74 -	-82	-90	-98
(Wind			ZARD	28.66.66.68.68.68.68.68.68.68.68.68.68.68	.4	REAS		\$51.00 £ 2000056	I HAZ	one i necui sirenco			
speeds	9.00	5 × 4 × 1 × 1 × 1	posed.	100000000000000000000000000000000000000	4	CARD		Flesh	ı may f	reeze v	within	30seco	nds.
greater than	■ · · · · · · · · · · · · · · · · · · ·	2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 /	affect	Affine was parts	Dang	-							
64 km/h	Townson Care	Smith . "sou b.	ne hoi	Section	3	ing o				्रेड्डिस्ट्रिस्ट्रिस्ट्र अर्ड्डिस्ट्रिस्ट्रिस्ट्रिस	awaning Tay		
have little	Awa	renes	s of ha	zard	1 -	sed fl							
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effect.)					minu	ite.							

The table was originally developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA, and is adapted from the 1995-1996 *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, published by the ACGIH. The ACGIH publication provides the equivalent table with temperature in degrees Fahrenheit and wind speed in mph.

Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36°C (96.8°F).

Attachment-59-3

TLVs Work/Warm-up Schedule for Outside Workers based on a Four-hour Shift*

The ACGIH has adopted the guidelines developed by the Saskatchewan Labour for working outdoors in cold weather conditions. These guidelines recommend protective clothing and limits on exposure time. The recommended exposure times are based on the wind chill factor, a scale based on air temperature and wind speed. The work-break schedule applies to any four-hour period with moderate or heavy activity. The warm-up break periods are of 10-minute duration in a warm location. The schedule assumes that "normal breaks" are taken once every two hours. At the end of a 4-hour period, an extended break (e.g. lunch break) in a warm location is recommended. More information is available in the ACGIH publications "2000 TLVs and BEIs" and "Documentation of TLVs and BEIs" and on the Saskatchewan Labour web page "Cold Conditions Guidelines for Outside Workers".

Air Tempe Sunny Sky		No No	ticeable	5 mph	Wind	10 mp	h Wind	15 mp	h Wind	20 mp	h Wind
°C (approx.)	°F (approx.)	Max. work Period	No. of Breaks* *	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to - 28°	-15° to - 19°	(Norm 1	breaks)	(Norm 1	breaks)	75 min.	2	55 min.	3	40 min.	4
-29°to - 31°	-20°to - 24°	(Norm 1	breaks)	75 min.	2	55 min.	3	40 min.	4	30 min.	5
-32° to - 34°	-25°to - 29°	75 min.	2	55 min.	3	40 min.	4	30 min.	5		
-35° to - 37°	-30° to - 34°	55 min.	3	40 min.	4	30 min.	5				
-38° to - 39°	-35° to - 39°	40 min.	4	30 min.	5			Non-er	Non-emergency		nergency nould
-40° to - 42°	-40°to - 44°	30 min.	5	Non-en	nergency	Non-emergency work should				cease	
-43° & below	-45° & below	Non-en work sl cease	nergency nould	work should cease cease							

^{*2000} TLVs and BEIs - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH), 2000 - page 176. Adopted from Saskatchewan Labour "Cold Conditions Guidelines for Outside Workers"

Issue Date: Sept 2004 Revision 1: October 2006

URS SAFETY MANAGEMENT STANDARD Manual Material Handling

1. Applicability

This standard applies to URS operations where personnel perform manual handling of materials. For this procedure, manual material handling (MMH) is defined as the movement of items by lifting, lowering, pushing, pulling, carrying, holding, or restraining.

2. Purpose and Scope

The purpose of this procedure is to prevent common injuries caused by the practice of MMH. Immediate or short-term effects include lacerations, bruises, and muscle fatigue. Long-term effects include chronic pain, typically in the lower back.

3. Implementation

Implementation of this procedure is the responsibility of the manager directing activities of the facility or site.

A Corporate, Regional, or Strategic Business Unit (SBU) HSE Manager must approve deviations from this procedure

4. Requirements

A. General

- Prior to lifting, lowering, pushing, pulling, carrying, holding, or restraining an object of any significant size or weight, employees must evaluate the object and the required task to determine if they can handle the object safely.
- If the employee has any doubt about whether than can safely move the object by themselves, additional manual or mechanical help should be obtained.
- 3. Healthy employees with no physician imposed restrictions should lift and carry a maximum of 50 pounds (23 kilograms) using proper lifting and carrying techniques. Physical and workplace factors may reduce this recommended weight limit (RWL) significantly and should be considered prior to attempting lifts of this magnitude.
- 4. An employee's personal "safe" MMH capability is defined as the employee's personal capability to manually lift, carry, push, or pull an object alone. This "safe" limit must consider the employee's past experience and training with MMH, health status, and any other personal or environmental characteristics affecting the

URS SAFETY MANAGEMENT STANDARD Manual Material Handling

- employee's ability to perform these tasks. An employee's "safe" MMH capability is typically at or below the calculated RWL.
- An MMH task that exceeds an employee's personal "safe" MMH capability or RWL should be brought to the attention of the applicable Manager.
- 6. If, due to a medical or health condition, the employee's physician or the employee has set a personal "safe" MMH capability, then appropriate medical documentation must be provided to the applicable Manager to define these limits.
- 7. A recommended RWL can be calculated using the factors described in Attachment 69-1. The weight limit derived from these calculations is considered to be a load that over 99% of men and over 75% of women can safely handle without application of engineering or administrative controls. Implementation of the calculations in Attachment 69-1 should only be attempted with the assistance of a safety professional knowledgeable in the application of these factors. The calculations are intended to determine RWLs for repetitive lifting scenarios rather than occasional lifts.

B. Pre-Planning

- 1. If a heavy object is to be moved to another location, the safest transport route should be determined prior to the activity.
- The area around the object and the route over which it will be transported should be checked for slip, trip, and fall hazards. Hazards should be removed prior to initiation of the task.
- The object to be moved should be inspected for grasping or handling hazards, including slivers, sharp edges, grease, water, etc. Eliminate or abate any identified hazards where possible. Safe grasping or handling points on the object should be determined.
- The distance to be traveled and the length of time which a grip on the object must be maintained should be considered before moving objects.

C. Lifting/Lowering Guidelines

 Reduce or eliminate manual lifting and lowering tasks where possible. Determine if there are ways to abate the safety and ergonomic hazards associated with manual lifting.

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- 2. The recommended technique for manual lifting/lowering involves five maneuvers:
 - a. Get a firm footing. Keep your feet apart for a stable base. Put one foot slightly in front of the other.
 - b. Bend your knees. Do not bend at the waist. When grasping the object, a firm grip should be obtained before lifting/lowering.
 - c. Lift/lower with your legs. Lift/lower the load slowly and in a straight line, avoiding sudden movements.
 - d. Keep the load close to the body. Generally, the closer the load is to the body, the less force it exerts on your back.
 - e. Keep your back straight. Do not add the weight of your body to the load. Avoid twisting.
- 3. When a turn or change of direction is necessary, the object should be lifted or lowered into a carrying position, then the whole body should be turned with the feet, avoiding any trunk twisting motion.
- 4. Objects to be lifted to shoulder height should first be lifted to waist height, then rested on a level surface so the grasping position can be changed prior to lifting to a higher level.
- 5. Employees should never lift a load above their head.

D. Carrying/Holding Guidelines

- Manual carrying is an inefficient way of transporting materials in the work place. Where possible, reduce or eliminate manual carrying tasks.
- 2. Employees should never carry a load above their head.
- 3. Carry an object close to the body using both hands. One-handed carries are awkward and tend to unbalance the employee.
- 4. Do not carry objects that are so large they will obstruct visibility.
- Grips on an object should not be changed while carrying or holding an object. Rest the object on a secure surface prior to changing grip.
- 6. Avoid two person carries where possible. If an object is of a size, shape, or mass that it requires two people to carry, use two people of similar size and physique. Perform lifting of the item in unison.
- 7. Avoid carrying objects on stairs, particularly where the line of sight may be obstructed or the object can interfere with leg movement.

07.1

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E. Pushing/Pulling Guidelines

- 1. Check the condition of the floor, ground, or other surface prior to pushing or pulling an object across it.
- 2. Be aware of the "break out" force of the object the force at which a push or pull overcomes the frictional force between the surface and object. Adjust posture to avoid losing balance when this point is reached.
- 3. Get assistance when moving or guiding a large load.
- 4. Where possible, always push rather than pull a load.

F. Workplace Design

- 1. Store heavy or bulky materials at heights between the knee and shoulder to avoid the need to stretch or bend.
- 2. Pack or arrange items to be lifted to avoid shifting of weight in the package.
- 3. Design work areas to avoid the need to lift, carry, push, or pull heavy or bulky materials for extended distances.
- 4. Design workplaces with the following in mind.
 - a. Lifts from the floor should be avoided.
 - b. The torso should never twist while handling loads.
 - c. Asymmetrical or unbalanced one-handed lifts should be avoided.
 - d. Loads should not be lifted with sudden movements.
 - e. Loads should not be lifted over obstacles.
 - f. Loads should not be lifted at extended reaches.
 - g. Uncomfortable postures should not be necessary throughout the work cycle.
 - h. Environmental factors (e.g., task lighting, dry work surfaces, heat stress) should be considered.

G. Training

- 1. Require that personnel who may have MMH as part of their duties receive training that includes the following topics:
 - a. Showing personnel how to avoid unnecessary physical stress and strain during MMH operations.

URS SAFETY MANAGEMENT STANDARD Manual Material Handling

- b. Teaching personnel to become aware of what they can comfortably handle without undue strain.
- c. Instructing personnel on the proper use of equipment.
- d. Teaching personnel to recognize potential hazards and how to prevent or correct them.
- 2. This training must be completed prior to an employee being assigned to a task that involves MMH activities.

5. Documentation Summary

Training rosters or other proof of completion of MMH training will be filed in the Health and Safety File.

6. Resources

- A. Recommended Weight Limit Calculations (RWL) Attachment 69-1
- B. Work Practices Guide for Manual Lifting, NIOSH http://www.cdc.gov/niosh
- C. Canadian Centre for Occupational Health and Safety http://www.ccosha.ca/oshaanswers/ergonomics/mmh/
- D. Oregon OSHA "Ergonomics of Manual Materials Handling" http://www.cbs.state.or.us/external/osha/pdf/workshops/206w.pdf
- E. North Carolina Department of Labor "A Guide to Manual Materials Handling and Back Safety http://www.nclabor.com/osha/etta/indguide/ig26.pdf
- F. European Agency for Safety and Health at Work http://uk.osha.eu.int/good_practice/msd.stm

Health, Safety, and Environment

RECOMMENDED WEIGHT LIMIT (RWL) CALCULATIONS

Attachment 69-1

Issue Date: Sept 04

This lifting equation, developed by the National Institute for Occupational Safety and Health (NIOSH), takes into account the weight of an object plus several other variables in lifting tasks that contribute to the risk of injury. For example, if the situation requires frequent lifts or lifting loads far away from the body, there is an increased risk of injury. Under these conditions, the weight limit would be reduced from a baseline weight or "load constant" (LC) to a recommended weight limit (RWL). A "load constant" (LC) of 23 kg (about 51 pounds) has been established by NIOSH as a load that, under ideal conditions, is safe for 75% of females and 90% of males.

To calculate the RWL, you must first measure or assess several variables related to the lifting task. The six variables that are considered in determining the RWL are:

The horizontal distance (H) the load is lifted (distance of hands from midpoint between ankles),

The starting height of the hands from the ground (V),

The vertical distance of lifting (D),

The time between lifts or frequency of lifting (F),

The angle of the load in relation to the body (e.g., straight in front of you or off to the side, A), and

The quality of the grasp or handhold based on the type of handles available (hand-to-load coupling, C).

Each of these variables is then assigned a numerical value (multiplier factor) from lookup charts. The equation includes six multiplier factors to calculate the RWL:

 $RWL = LC \times HM \times VM \times DM \times FM \times AM \times CM$

Where LC is the load constant (23 kg) and other factors in the equation are:

HM, the "Horizontal Multiplier" factor.

VM, the "Vertical Multiplier" factor,

DM, the "Distance Multiplier" factor,

FM, the "Frequency Multiplier" factor.

AM, the "Asymmetric Multiplier" factor, and

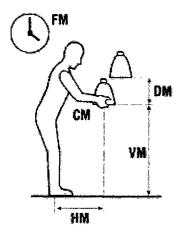
CM, the "Coupling Multiplier" factor.

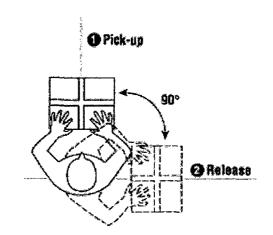
Health, Safety, and Environment

RECOMMENDED WEIGHT LIMIT (RWL) CALCULATIONS

Attachment 69-1

Issue Date: Sept 04





Horizontal Multiplier is the distance the object is from the body. Measure (in centimeters) the distance from in between the person's ankles to their hands when holding the object. Write down this number. Next, look up the number on the accompanying chart and find the matching "multiplier factor". Use this factor in the lifting equation.

Vertical Multiplier is measured as the starting point of the lift and is the distance in centimeters of the hands up from the ground. Measure this distance and use the number to determine which value to use on the chart.

Distance Multiplier is the number of centimeters the load travels up (or down) from the starting position. Measure this distance and use the number to determine which value to use on the chart.

Frequency Multiplier is how often the lift is repeated within a certain time period. You need to determine if the lift is done while standing or stooping, for more or less than one hour (in total time for the shift), and how much time there is for rest between lifts.

Asymmetric Multiplier measures if the body must twist or turn during the lift. This measurement is done in degrees (with 360 being one complete circle).

Coupling Multiplier determines the "coupling" or type of grasp the person has on the container. It rates the type of handles as good (handles), fair (make-shift cut outs in cardboard boxes) or poor. You also need to know if the lift is done in a standing or stooping position.

When these multipliers are placed into the equation, determine the RWL. If the weight of the object to be lifted exceeds the RWL, the task is considered to be dangerous. Assess the relevant factors which contribute most to the risk (the lower the factor, the more it contributes to the risk) and redesign the handling task.



Health, Safety, and Environment RECOMMENDED WEIGHT LIMIT (RWL) CALCULATIONS

Attachment 69-1

Issue Date: Sept 04

The lifting equation only applies in certain situations. It does not apply in situations where a person is lifting (or lowering):

With one hand,

For over 8 hours,

While seated or kneeling,

In a restricted work space,

Objects that are unstable (such as buckets or containers of liquids),

While pushing or pulling,

With wheelbarrows or shovels,

With high speed motion (faster than about 30 inches/second),

Extremely hot or cold objects or in extreme temperatures, or

With poor foot/floor coupling (high risk of a slip or fall).

This equation applies to most workers for:

Two-handed lifting,

Comfortable lifting postures, and

Comfortable environments and non-slip floorings.

FACTORS USED IN RWL CALCULATIONS

Horizontal Multiplier (HM): Horizontal distance (H, in cm) from the midpoint between the ankles to the hands while holding the object.

H = Horizontal Distance (cm)	HM Factor
25 or less	1.00
30	0.83
40	0.63
50	0.50
60	0.42



Health, Safety, and Environment

RECOMMENDED WEIGHT LIMIT (RWL) CALCULATIONS

Attachment 69-1

Issue Date: Sept 04

Vertical Multiplier (VM): The vertical distance (V, in cm) of the hands from the ground at the start of the lift.

V = Starting Height (cm)	VM Factor
0	0.78
30	0.87
50	0.93
70	0.99
100	0.93
150	0.78
175	0.70
>175	0.00

Distance Multiplier (DM): The vertical distance (D, in cm) that the load travels.

D = Lifting Distance (cm)	DM Factor		
25 or less	1.00		
40	0.97		
55	0.90		
100	0.87		
145	0.85		
175	0.85		
>175	0.00		

Asymmetric Multiplier (AM): The twisting angle (A) of the body while lifting, measured in degrees.

A = Angle (degrees)	AM Factor
90°	0.71
60°	0.81
45°	0.86
30°	0.90
O°	1.00



Health, Safety, and Environment RECOMMENDED WEIGHT LIMIT (RWL) CALCULATIONS

Attachment 69-1

Issue Date: Sept 04

Frequency Multiplier (FM): The frequency (F) of lifts and the duration of lifting (in minutes or seconds) over a work shift.

F = [FM Factor							
Time Between	Lifting While Standing		Lifting While Stooping					
Lifts	One Hour or Less	Over One Hour	One Hour or Less	Over One Hour				
5 min	1.00	0.85	1.00	0.85				
1 min	0.94	0.75	0.94	0.75				
30 sec	0.91	0.65	0.91	0.65				
15 sec	0.84	0.45	0.84	0.45				
10 sec	0.75	0.27	0.75	0.27				
6 sec	0.45	0.13	0.45	-				
5 sec	0.37	- [0.37					

Coupling Multiplier (CM): The quality of grasp (or coupling, C) classified as good, fair or poor and depends on the body position (either standing or stooping).

C =		Factor
Grasp ,	Standing	Stooping
Good		
(handles)	1.00	1.00
Fair	1.00	0.95
Poor	0.90	0.90

APPENDIX C

Emergency Telephone Numbers and Hospital Information

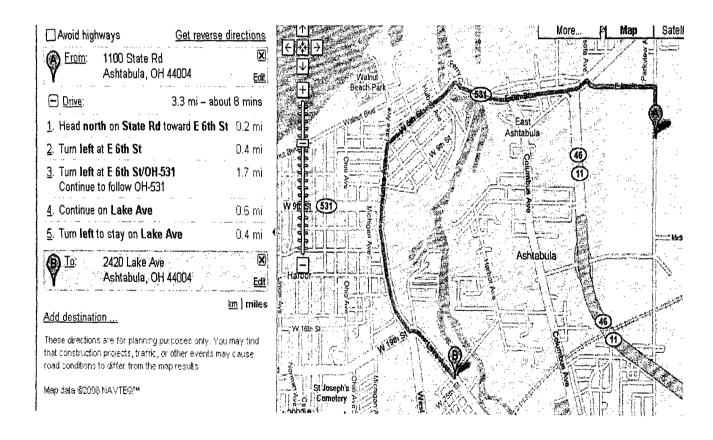
Directions to the Hospital:

Ashtabula County Medical Center 2420 Lake Avenue

Ashtabula, Ohio 44004

Phone Number: 440-997-6600

Exiting the site to State Road, turn left (south) travel approximately 0.75 mile turn right (west) at the first road which is east 21st Street. You will cross State Route 11 continue on to the stop sign. At the stop sign turn left (south) onto Columbus Avenue for approximately 0.25 miles turn right (west) at the flashing light onto east 23rd. Travel on east 23rd to the stop sign at Harbor Avenue. Turn left (south) on Harbor and then an immediate right onto east 24th street. The hospital is on the south east corner of east 24th street and Lake Avenue.



Directions to the Outpatient Clinic (non-emergency care):

Miller Outpatient Therapy

456 South Main Street Andover, Ohio 44003

Phone Number: 440-293-4226

Exiting the site to State Road, turn left (south) travel approximately 0.75 mile turn right (west) at the first road which is east 21st Street. You will cross State Route 11, turn left (south) onto southbound on-ramp for State Route 11. Travel south approximately 21 miles to US Route 6. Turn left (east) onto US Route 6 and travel approximately 7.4 miles to State Route 7 (Main Street). Turn right (south) onto State Route 7. The Clinic is near the intersection of State Route 7 and South Park Drive

1100 State Rd Ashtabula, OH 44004 Drive: 29.8 mi – about 36 mins		1.11	<u>па іміаћг</u>	Conneau H Coth Conneau Conneau Reshabutat Kingsville
1. Head south on State Rd toward Middle	Rd	A 6- 1 119 PR / 419	0.6 mi 1 min	eneva
→ 2. Turn right at E 21st St			0.5 mi 2 mins	Jefferson (7)
◆ 3. Turn left to merge onto OH-11 S	···· ··· ··· ··· ··· ··· ··· ··· ··· ·		20.6 mi 19 mins	
4. Take the US-6 exit toward Chardon/And	lover		0.3 mi	- nout
← 5. Turn left at US-6/US-6 E Continue to follow US-6		er en et at ar ar	7.4 mi 13 mins	Start
6. At Public Square, take the 1st exit onto	ОН-7	universalities and a second	0.5 mi .1 min	
(B) 456 S Main St Y Andover, OH 44003				
These directions are for planning purposes only. Yo cause road conditions to differ from the map results	u may find that construction projects, traffic, or	r other even	ts may	

APPENDIX D

Health & Safety Incident Report Form

DAILY FIELD AIR MONITORING ACTIVITY LOG

DATE	ACTIVITY MONITORED	TIME	LOCATION	READING	ACTION	READING BY
DATE	ACTIVITI MONITORED	. 1715	200.111014	1,2,1,0		

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DAILY INSTRUMENT CALIBRATION CHECK SHEET

	<u> </u>		DI LICENTE CONTRACTOR	or Children bi		
DATE	INSTRUMENT	BATTERY CHECK OK?	ZERO ADJUST OK?	CALIBRATION GAS (PPM)	READING (PPM)	CALIBRATED BY
				7.4		
						<u> </u>
]	i I	

Health and Safety Program

INCIDENT / NEAR MISS REPORT FORM

Attachment 49-1

Revision 3: Oct 2007

ADMINISTRATIVE INFORMATION	(To be completed by Supervisor)		
Corporate Communications US Site Code:	Project/Order Number:		
URS Division	☐ EG&G Division		
RBU:	SBU:		
Region:	SBE Director:		
Client Sector:	Program:		
Site or Office:	Location/Client Name:		
Date/Time of Event:	Time Work Started:		
Date/Time Supervisor Notified:	Employee Submitting Report:		
	No		
	ck all applicable items)		
Illness (Check one) Injury (Check one) ☐ Employee ☐ Employee ☐ Subcontractor ☐ Subcontractor ☐ Other ☐ Other	Near Miss (Check the potential consequences): ☐ Injury ☐ Environmental release ☐ Equipment Damage ☐ Other (describe) ☐ Property Damage		
Property Damage (Check one) ☐ Company (owned, leased, rented) ☐ Client/Customer ☐ Other Vehicular Accident ☐ Company (owned) ☐ Client/Customer ☐ Other	t (Check one)		
	SCRIPTION		
	ETERMINATION		
Root Cause (State the root or primary cause, then select the			
Contributing Causes (Describe any contributing causes, the	NG FACTORS n select the applicable cause categories from Page 4):		
List methods of preventing/avoiding this type of incident/nea action for each root cause.	/E ACTIONS r miss in the future. There must be one or more corrective		
NOTE: If this is a near miss report, no further information is re	quired. Submit only the first page of the form. The preferred		
method of distribution of near miss reports is by e-mail attachn reports to <u>incidentreport@urscorp.com</u> . Alternatively, reports	nent in either Word or scanned to PDF. Forward URS near miss		

Health and Safety Program

INCIDENT / NEAR MISS REPORT FORM

Attachment 49-1

Revision 3: Oct 2007

FOR INJURIES/ILLNESS ONLY Employee Information (To be completed by affected employee) Name of Injured/III Employee: Contact Phone Number: **Employee Number:** What was your location when the injury/illness occurred? What were you doing when the injury/illness occurred? Describe the activity as well as the tools, equipment, or material you were using. What happened? Describe how the injury/illness occurred. What was the injury or illness? Describe the part of the body that was affected and how it was affected. Use the Body Part pick list on Page 4 to aid in your description. What level of medical treatment did you receive? First Aid Clinic/Physician Emergency Room Refused/None List witnesses and/or other employees involved. Attach statements where applicable. Do you feel URS/EG&G provided you with the proper safety instructions (including PPE usage) for the task you were How do you think this type of incident could be prevented or avoided in the future? Mark all PPE being used when the incident occurred: ☐ Safety Glasses ☐ Safety Goggles ☐ Face Shield ☐ Safety Shoes ☐ Half-face Respirator ☐ Full-face Respirator ☐ Chemical Gloves ☐ Protective Gloves ☐ Hard Hat ☐ Hearing Protection Other (describe): Employee Signature: Date:

Health and Safety Program

INCIDENT / NEAR MISS REPORT FORM

Attachment 49-1

Revision 3: Oct 2007

Supervisor Information (To be completed by affected employee's supervisor)			
Describe any additional/different details other than those provided by employee. Avoid use of employees' names, where possible. Attach additional sheets, drawings, or photos, as needed.			
Were the required tools available at the time of the injury? Yes No (Explain below)			
At the time of the injury, was the employee using the correct tools for the task?			
Was the employee sent for substance screening? ☐ Yes ☐ No (Explain below)			
How do you think this type of incident could be prevented or avoided in the future?			
Supervisor Signature: Date:			
Additional Sheets Attached?			
HSE Representative Comments			
Signature: Date:			
Additional Sheets Attached?			
Site/Office Manager Comments			
Signature: Date:			
Additional Sheets Attached?			
DISTRIBUTION			
NOTE: The preferred method of distribution of this report is by e-mail attachment in either Word or scanned to PDF. Forward URS injury/illness reports to incidentreport@urscorp.com . Alternatively, reports may be faxed to 512.419.6413. Reports must be delivered within 24 hours of incident.			
Additional Distribution: Program/Client Sector Manager Regional/SBE/SBU HSE Manager			

Health and Safety Program

INCIDENT / NEAR MISS REPORT FORM

Attachment 49-1

Revision 3: Oct 2007

Clavicle & Scapula)

☐ Wrist(s) and Hand(s)

☐ Wrist

CAUSE CATEGORIES Check all cause categories, which apply to the incident/near miss, then choose the root cause (or causes) category from the boxes checked. Enter where indicated on Page 1. PHYSICAL/EQUIPMENT, TOOLS, and PPE PHYSICAL/ENVIRONMENT Failure due to improper maintenance Extreme cold/ice Extreme heat Failure due to improper design ☐ Working/walking surface unfavorable Other Inadequate lighting HUMAN ☐ Excessive noise ☐ Failure to adequately recognize hazards Chemical exposure ☐ Failure to follow procedures Biological hazards (animal/plant) ☐ Failure to recognize condition change Other weather Impaired state (drug, alcohol, other) Other Physical/psychological limitation for task **SYSTEMS** ☐ Inadequate communications (i.e., supervisor/employee) Carelessness by affected person(s) Inadequate training/instruction ☐ Inadequate management system Carelessness by other person(s) Missing or incorrect procedures or planning ☐ Improper selection of equipment/tool/PPE Improper use of equipment/tool/PPE Inadequate management emphasis on safety Corporate/operations procedures not communicated Other ☐ Other **BODY PART PICK LIST** ANKLE/FOOT **HEAD/FACE MISCELLANEOUS** TRUNK ☐ Ankle ☐ Brain Artificial Appliance ☐ Abdomen Including Groin ☐ Foot ☐ Ear(s) (Braces, Etc.) ☐ Buttocks ☐ Great Toe ☐ Face, Multiple Parts ☐ Circulatory System ☐ Chest (Incl. Ribs, ☐ Toe(s) ☐ Facial Bones ☐ Digestive System Sternum & Soft Tissue) ☐ Head NEC ☐ Insufficient Info to Identify; ☐ Heart **BACK** ☐ Jaw Unclassified GiH 🗌 ☐ Back (All Other) Larynx Nervous System Internal Organs ☐ Cervical Mouth Multiple Trunk No Physical Injury ☐ Disc (Back) Multiple Head Injury ☐ Stress Pelvis \Box ☐ Disc (Neck) Nose Sacrum and Coccyx Low Back Area (Incl.) Other facial soft tissue ☐ Uro-Genital Lumbar & Lumbo-Sacral) **MULTIPLE BODY PARTS** ☐ Scalp ☐ Lumbar and/or Sacral ☐ Skull ☐ Body Systems & Multiple UPPER EXTREMITY Vertebrae ☐ Teeth **Body Systems** Arm, Multiple ■ Multiple Neck Injury Multiple Body Parts ☐ Elbow ☐ Soft Tissue-Neck KNEE/LEG ☐ Finger(s) □ Spinal Cord ☐ Knee ☐ Forearm ☐ Upper Back Area ☐ Leg, Multiple RESPIRATORY ☐ Hand (Thoracic Area) ☐ Lower Leg Lung(s) Lower Arm ☐ Vertebrae ☐ Multiple Lower ☐ Respiratory System Extremities ☐ Trachea ☐ Shoulder(s) EYE Upper Leg ☐ Thumb ☐ Eye(s) ☐ Upper Arm (Incl.

APPENDIX E

Health & Safety Plan Compliance Agreement

SAFETY PLAN COMPLIANCE AGREEMENT AND MEDICAL EMERGENCY CONTACT SHEET

Ι,	have received a copy of the Health and
Safety Plan for this Project. I have with all of its provisions. I under	reviewed the plan, understand it, and agree to comply stand that I could be prohibited from working on the th and safety requirements specified in the plan.
SIGNED	Date
operations. It is in no way a requirements of the URS Health a	ntact Sheet will be kept in the Support Zone during site substitute for the Medical Surveillance Program and Safety Program. This data sheet will accompany sistance or transport to hospital facilities is necessary.
Emergency Contact:	Phone #:
Relationship:	
Do you wear contact lenses?	

